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# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

## **THESIS**

**OPERATION NOBLE EAGLE AND THE USE OF COMBAT  
AIR PATROLS FOR HOMELAND DEFENSE**

by

Mark J. Reents

December 2008

Thesis Advisor:  
Second Reader:

Daniel Moran  
Robert Simeral

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**OPERATON NOBLE EAGLE AND THE USE OF COMBAT AIR PATROLS FOR  
HOMELAND DEFENSE**

Mark J. Reents  
Major, United States Air Force  
B.S., Embry-Riddle Aeronautical University, 1991

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES  
(HOMELAND SECURITY AND DEFENSE)**

from the

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## **ABSTRACT**

This thesis considers why the United States Air Force is still flying combat air patrols (CAPs) over the United States in support of Operation Noble Eagle (ONE) more than seven years after 9/11. The USAF is struggling to support two regional conflicts while defending the homeland and trying sustain and recapitalize its fleet of aircraft. Given these broader long-term requirements, it is time to reevaluate the need for ONE's costly airborne CAPs, in light of improvements in aviation security, together with the absence of terrorist attacks on the homeland and of no actionable intelligence indicating an imminent air threat in America. The following sub-areas were researched to help evaluate and recommend changes to the current ONE CAP policy: the history of air defense in America; U.S. air defense mistakes on 9/11 and the evolution of ONE; improvements in the intelligence community and aviation security since 9/11; specific threats to aviation and the risk of another 9/11-style attack in the United States; and the cost and impact of the ONE alert and CAP missions on the combat capability of the participating USAF squadrons. The thesis concludes by considering other, more cost-effective, air defense systems available to support Noble Eagle in lieu of fighter CAPs.



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## **I. OPERATION NOBLE EAGLE**

### **A. MAJOR RESEARCH QUESTION**

The key research questions analyzed are: Why is the U.S. Air Force (USAF) still flying combat air patrols (CAPs) in support of the post 9/11 air defense mission called “Operation Noble Eagle” (ONE), and does the policy need to change? Answering these questions requires that we understand the history of air defense in American and how ONE evolved into its current steady state in order to evaluate the Air Force’s continued support of this costly homeland defense operation despite many other competing calls upon its limited resources.

The following sub-areas were researched to help evaluate the Department of Defense’s (DoD) current Noble Eagle policy and answer the primary research questions.

- History of air defense in America.
- U.S. air defense performance on 9/11.
- Key changes in aviation security since 9/11 to help mitigate the risk.
- Threats to aviation and the risk of another 9/11 type attack.
- Impact of ONE on USAF active duty and ANG fighter squadrons.
- Other air defense options available.
- Are the North American Air Defense Command (NORAD) and the ANG on a course of path dependence and what are the effects of bureaucratic politics on the current ONE policy?

### **B. IMPORTANCE**

President George Bush authorized the mobilization of 35,000 ANG and reservists on 15 September 2001 for HD and civil support (CS) in response to the terrorist attacks

on the World Trade Center and Pentagon.<sup>1</sup> The mission was called “Operation Noble Eagle.” Part of the operation included fighter aircraft flying combat air patrols over cities throughout the country as well as sitting on ground alert.<sup>2</sup> The fighters were armed and had the responsibility of intercepting and potentially shooting down hijacked aircraft. ONE fighter missions were initially supported by ANG and reserve squadrons but were soon augmented by the active duty U.S. Air Force.<sup>3</sup> Eventually the active duty fighter squadrons took over most of the long duration ONE CAP missions as well as some of the alert commitments. The ANG squadrons, who traditionally have been responsible for the homeland defense mission, provide some support for short-duration ONE CAPs but mostly sit ground alert with their fighter aircraft.<sup>4</sup>

Since 9/11, the Air Force has flown over 184,000 hours during over 50,000 sorties within the continental United States, ostensibly in support of the war on terror.<sup>5</sup> The sorties involve flying endless circular CAPs over major cities, critical infrastructure (CI) and special national events. These missions have had a negative impact on the training and readiness of the pilots, jets, and the squadrons involved.<sup>6</sup> By 2005, Operation Noble Eagle had already cost the Department of Defense (DoD) more than \$27 billion and the combat air patrols have continued despite the absence of any clear intelligence about specific air threat(s) to our homeland defense.<sup>7</sup>

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<sup>1</sup> “Operation Noble Eagle,” GlobalSecurity.org, 27 April 2005, [www.globalsecurity.org/military/ops/noble-eagle.htm](http://www.globalsecurity.org/military/ops/noble-eagle.htm) (accessed 25 April 2008).

<sup>2</sup> Adam J. Hebert, “Homeland Air Force,” Air Force Magazine, (January 2004): 36-40.

<sup>3</sup> John L. Conway III, “AEF and Homeland Security: The Air National Guard’s Competing Roles,” Quick-Look 04-26, <http://research.airuniv.edu> (accessed 25 April 2008).

<sup>4</sup> Conway, 1.

<sup>5</sup> “AFNORTH Sortie Count,” 1st Air Force, 1 October 2007, [www.1af.acc.af.mil/](http://www.1af.acc.af.mil/) (accessed 23 May 2008).

<sup>6</sup> Otto Kreisher, “The Years of Noble Eagle,” Air Force Magazine, June 2007, 52.

<sup>7</sup> Kreisher, 50-54. Adam J. Hebert, “Noble Eagle Without End,” Air Force Magazine, February 2005, 42-47. John L. Conway III, “AEF and Homeland Security: The ANG’s Competing Roles,” Quick-Look 04-26, <http://research.airuniv.edu> (accessed 25 October 2007).

### C. PROBLEMS AND HYPOTHESES

Something needed to be done to ensure security of our skies immediately after the attacks on the World Trade Center towers and the Pentagon. Seven years later, however, there is no clear reason why are we are still flying CAPs and executing ONE as a “steady state” operation in the same basic form put in place on the day of the attacks. Countless man-hours, thousands of flight hours, and billions of dollars later we are still sitting alert and flying random CAPs around the country. Without credible intelligence of threats, the national leadership and the USAF need to tailor combat air force’s (CAF) defense posture accordingly and not expend our nation’s finite resources on a mission whose strategic payoff appears to be extremely limited.

In 1958, at the height of the Cold War, there were over 100 active and ANG bases with 1,500 fighter-interceptors on alert.<sup>8</sup> After the Cold War, the alert commitment fell drastically to only 14 aircraft at seven ANG bases in the continental U.S. on 9/11.<sup>9</sup> Following the 9/11 attacks, the North American Aerospace Defense Command (NORAD) and ANG’s 1<sup>st</sup> Air Force dusted off their Cold War air defense plans for the “new threat” and reopened a number of closed alert facilities around the country. By 2002, NORAD and the ANG had gained additional federal funding and expanded their alert commitments to 30 bases. “Compared to mid-2001, the ANG has more than five times as many airmen devoted to the HD alert mission.”<sup>10</sup> Operation Noble Eagle has become a political and financial success for the NORAD and the ANG, but its combat air patrols have become an unnecessary burden on the combat air forces.

The policy supporting Operation Noble Eagle CAPs was initially driven by the desire to prevent another terrorist attack employing commercial aircraft; yet the Air Force’s current air defense force structure and the use of CAPs is modeled on Cold War bomber defense paradigms. This research will take a critical look at this apparent

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<sup>8</sup> John Pike, “Operation Noble Eagle,” *GlobalSecurity.org*, 27 April 2005, [www.globalsecurity.org/military/ops/noble-eagle.htm](http://www.globalsecurity.org/military/ops/noble-eagle.htm) (accessed 3 November 2007).

<sup>9</sup> MSNBC, “9/11 Commission Staff Statement No. 17,” *National Commission on Terrorist Attacks Upon the United States*, 27 June 2004, [www.msnbc.msn.com/id/5233007/](http://www.msnbc.msn.com/id/5233007/) (accessed 3 November 2007).

<sup>10</sup> Hebert, 36.

mismatch of ends, ways, and means, in order to determine if we are simply following a course of path dependence for Homeland Defense and/or if bureaucratic politics are preventing a course correction in the ONE policy for using combat air patrols.

The preliminary hypothesis that will guide this research indicates the ONE policy needs to be reevaluated and the random combat air patrols discontinued. This hypothesis is based on four key preliminary inferences derived from mission experience up to now: 1) there have been significant improvements in intelligence coordination and aviation security over the last seven years that have reduced risk and minimized the threat; 2) there is no intelligence indicating a specific aviation-related threat to the homeland; 3) the cost of the CAPs to the Air Force in terms of dollars and impact on combat capability outweighs the strategic benefits of Noble Eagle as currently conceived; and 4.) alert fighters, along with more cost effective ground-based air defense systems, are sufficient to protect special events and critical infrastructure in America.

#### **D. METHODS AND SOURCES**

Very little academic literature or debate relates to Operation Noble Eagle and the use of fighters from homeland defense. Most of the information written about the subject is historical or informational articles found in journals such as *AIR FORCE Magazine* or policy documents. The lack of public debate about ONE may be an indication that the politicians, the Air Force, and the public have simply accepted the mission with little thought to its cost and/or utility.

This thesis is a review of contemporary air defense history and strategies which will seek to explain some of the factors that have led to the current policy for Operation Noble Eagle and its use of combat air patrols. It will use the theories of path dependence and bureaucratic politics to help explain why the ANG and NORAD continue to support the CAP missions, even though they have become a costly steady state operation that have lasted for over seven years after the 9/11 attacks. The aim of this thesis is to evaluate the threat and risk versus the cost of the ONE CAP missions, as well as their

impact on Air Force combat capability. It will conclude by recommending policy changes intended to better align costs and benefits within the framework of overall Air Force operations.

Path dependence is a central concern for the analysis of the ONE policy. It occurs when institutions become self reinforcing. It can be initiated by decisions that at the time seem “inconsequential but lead to uncontrollable consequences.”<sup>11</sup> Douglas Puffert says “History matters, it has an enduring influence...choices made on the basis of transitory conditions can persist long after those conditions change.”<sup>12</sup> “Lock-in” is an important concept in path dependence. It means “having to accept inferior standards, even though superior alternatives exist...and the costs of switching are not high.”<sup>13</sup>

Much research within the area of bureaucratic politics refers to the popular theory called “Miles’ Law.” Miles is credited with the phrase, “Where you stand depends on where you sit.” Though his research is not specific to security policy, it does portray an organizational dynamic in which individual judgments are strongly influenced by the institution to which the individual belongs; a process characterized by careerism and defense of individual empires.<sup>14</sup> The Bureaucratic Politics approach will offer analytical insight into the current Operation Noble Eagle policy and the desire for those involved to keep promoting the mission.

The majority of sources for the thesis will be secondary (professional journals, news media, books, and internet resources). Primary sources will also be used chiefly in the form of phone interviews and email correspondence with people currently involved in the U.S. air defense mission.

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<sup>11</sup> Stan Leibowitz and Stephen E. Margolis, “Policy and Path Dependence,” *Regulation, The Cato Review of Business & Government* (Fall 1995) <http://www.cato.org/pubs/regulation/reg18n3.html> (accessed 6 December 2007).

<sup>12</sup> Douglas Puffert, “Path Dependence” *EH.Net* <http://eh.net/encyclopedia/article/puffert.path.dependence> (accessed 6 December 2007).

<sup>13</sup> Leibowitz.

<sup>14</sup> Rufus E. Miles Jr., “The Origin and Meaning of Miles’ Law.” *Public Administration Review* 38, no. 5 (Sep.-Oct., 1978) 399-403.

## **E. THESIS OVERVIEW**

This thesis will cover a broad range of issues in order to provide the necessary background to make an informed policy decision for modifying the combat air patrol requirements for Operation Noble Eagle. The thesis is divided into seven chapters. Chapter I will cover the purpose of the thesis, its importance, problems, hypotheses, methods and sources, and the thesis overview. Chapter II will provide a brief history of air defense in American before 9/11 to give the reader some background for how ONE has gone almost full circle back into the Cold War air defense structure. Chapter III, like the War and Navy Departments' reaction to and after the Pearl Harbor experience, the DoD was very sensitive after 9/11 to the possibility of additional criticism that would follow another surprise attack that they were not prepared to counter. This chapter will review the air defense response and mistakes on 9/11, and the subsequent evolution of Noble Eagle. It will also provide insight into our current ONE basing, force structure, and mission. Chapter IV will evaluate the threats to aviation that fighter aircraft in an air defense role can counter. It will also summarize the major changes in aviation security and the intelligence community (IC) since 9/11. A general vulnerability assessment is provided in this chapter for a risk based decision analysis on the likelihood of another 9/11 hijacked aircraft attack. Chapter V will research the costs/benefit of ONE and evaluate its impact on the combat capability of USAF active duty and ANG squadrons. Chapter VI will look at using more cost effective alternatives including using ground based air defense systems in lieu of air patrols. Chapter VII will complete this thesis by summarizing the findings and offer the academic theories of path dependence and bureaucratic politics as a possible explanation for why it appears that decision makers have allowed the Operation Noble Eagle CAPs to continue in their current "steady state" unchallenged. The chapter will conclude by recommending a new policy of using combat air patrols in America *only* with clear and actionable intelligence indicating that a specific threat from the air exists for a special event with national security interest, a key political person, or a piece of critical infrastructure.

## **II. U.S. AIR DEFENSE BEFORE SEPTEMBER 2001**

### **A. THE RISE AND FALL OF AIR DEFENSE IN AMERICA**

#### **1. Air Defense during World War II**

Air defense has been part of our country now for almost 100 years. Alexander Graham Bell warned about the possibility of German airship raids on the U.S. in 1916.<sup>15</sup> Many experts studied the problem of air defense before WWII as aircraft acquired the kinds of capabilities that could turn theory into practice. Aviation pioneers like Brigadier General “Billy” Mitchell built the foundation for the future of Air Defense in America. Traditionally, the U.S. military’s airpower defended the nation through projection of force around the world. Prior to WWII, defending the homeland was a strategic problem that depended on forward defenses and the physical distance to potential threats. That strategy changed after the Japanese attack on Pearl Harbor. The “Rainbow” plan proposed by the U.S. War Department in 1940 to defend the homeland included 2,000 Army and Navy aircraft on continuous patrols of the coastlines.<sup>16</sup> This plan called for too many of our scarce combat aircraft resources and was eventually scaled back as the threat to the homeland subsided and the overseas conflicts in Europe and the Pacific intensified.<sup>17</sup>

Air Defense Command (ADC) was established in 1940 and assigned the mission of defending the continental United States (CONUS) from aerial attack. It maintained that mission for almost 40 years.<sup>18</sup> During WWII, the ADC was organized into four Numbered Air Forces and was divided into separate air defense districts (see Figure 1).<sup>19</sup>

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<sup>15</sup> Walter J. Boyne, “The Rise of Air Defense,” *Air Force Magazine*, (December 1999), 1-6.

<sup>16</sup> Edward S. Miller, *War Plan Orange: The U.S. Strategy to Defeat Japan, 1897-1945* (Annapolis, Md.: Naval Institute Press, 1991), 215-231.

<sup>17</sup> Simon Rigge, *War in the Outposts, World War II* (Alexandria, VA.: Time Life Books, 1980), 10.

<sup>18</sup> Kenneth Schaffel, *The Emerging Shield: the Air Force and the Evolution of Continental Air Defenses, 1945-1960* (Washington D.C.: Office of Air Force History, 1991), 278.

<sup>19</sup> AF Historical Research, [http://afhra.maxwell.af.mil/rso/rso\\_index.html](http://afhra.maxwell.af.mil/rso/rso_index.html) (accessed 20 August 08).



Air Defense Command used active and passive measures to defend the country. Active measures included fighter aircraft, antiaircraft artillery, and barrage balloons (airborne obstacles). Passive measures included blackouts, dispersion of critical infrastructure, and camouflage designed to limit the effects of an enemy attack.<sup>20</sup> The ADC also flew coastal patrols looking for enemy submarines in a effort to help protect our ports and shipping lanes.<sup>21</sup> Air Defense Command shifted their focus to training replacement combat pilots for overseas deployments as the threat of attack on the U.S. homeland diminished in 1942.<sup>22</sup>



Figure 1. ADC Structure During WWII<sup>23</sup>

## 2. The Air Defense Command in the Early Cold War (1946-1952)

During World War II, the U.S. and Canada maintained “strategic direction and command of their own armed forces” while cooperating in the fight against the Axis Powers.<sup>24</sup> This relationship continued after the war over concerns of attack from the ever

<sup>20</sup> War Department Field Manual FM100-20, *Command and Employment of Air Power*, (Washington, D.C.: Government Printing Office, 1944), Section IV.

<sup>21</sup> Geoffrey Perret, *Winged Victory: Army Air Forces in World War II* (New York: Random House, 1993), 83.

<sup>22</sup> 1<sup>st</sup> Air Force, “History of 1<sup>st</sup> Air Force,” <http://www.1af.acc.af.mil/library/factsheets/factsheet.asp?id=4106> (accessed 27 August 2008).

<sup>23</sup> Wikimedia Foundation, Inc. “ADC,” [http://en.wikipedia.org/wiki/Air\\_Defense\\_Command](http://en.wikipedia.org/wiki/Air_Defense_Command) (accessed 23 August 2008).

<sup>24</sup> Joseph T. Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defense, 1945-1958* (Vancouver: University of British Columbia Press, 1987), 13.

present but singular threat from the Soviet Union and their massive bomber fleet. Although it took several years for the U.S. to react to the air threat from the Soviets because Air Defense Command's force structure was cut drastically after World War II during a period of rapid demobilization and slashed budgets.<sup>25</sup> At one point in 1946, ADC was just a headquarters organization with two squadrons assigned on paper, but no aircraft or pilots. By 1953, an extensive integrated network of fighter aircraft sitting alert and flying in defensive combat air patrols (CAPs) along with early warning aircraft, ground based radars, and command, control, and communication (C3) centers were operation throughout the U.S. and Canada.<sup>26</sup>

### **3. The Height of the Cold War for Air Defense Command (1953-1963)**

The capability for early warning and defense against Soviet bomber attacks continued to be important for the DoD and ADC. Early use of fighter CAPs against attacks was endorsed in 1953 in a study by the Massachusetts Institute of Technology (MIT) and adopted by ADC.<sup>27</sup> The study recommended placing CAPs along warning lines in Canada as a defense in depth to give our fighters a chance to counter the bomber attack (see Figure 2).<sup>28</sup> Canada realized at this point that it was in their best interest to combine forces with the U.S. to counter the expanding Soviet force of long-range nuclear bombers.<sup>29</sup> A single command structure was needed to maintain tactical control over all the complex air defense networks that had been built in an effort to integrate them into a unified and joint international command.

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<sup>25</sup> Boyne, 1.

<sup>26</sup> Boyne, 3.

<sup>27</sup> Jockel, 61-62.

<sup>28</sup> Jockel, 65-68, 89-90.

<sup>29</sup> Major William H. Dawson, *The Usefulness of NORAD in the Aerospace Environment* (Maxwell AFB, Ala.: Air Command and Staff College, 1973), 10.

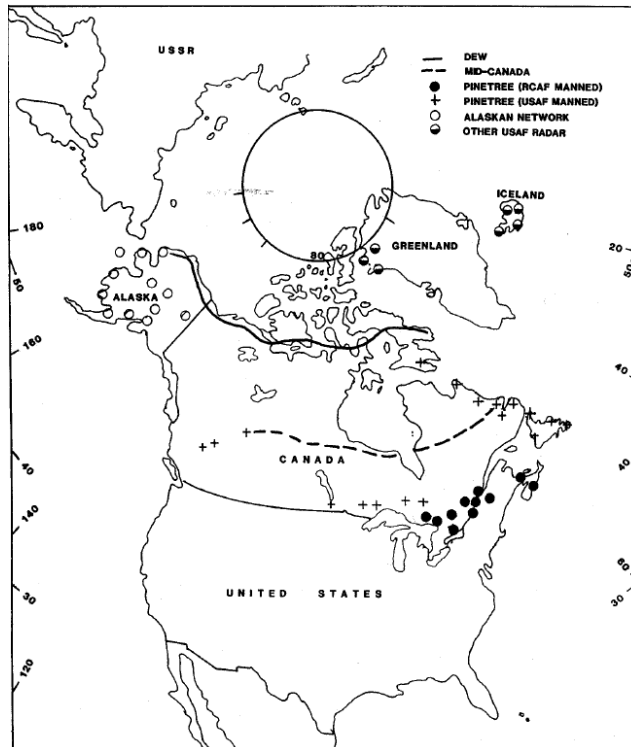


Figure 2. Early Air Defense Warning and CAP Lines<sup>30</sup>

North American Air Defense Command (NORAD) was established in September 1957 to improve coordination and cooperation between the Army, Air Force, Navy, and Canadian air defense forces. The Air Defense Command was also moved under NORAD's operational control.<sup>31</sup> NORAD's headquarters was established at Peterson Air Force Base (AFB), Colorado. The NORAD commander's C3 center had the responsibility for fusing the sensor systems around the country to provide an integrated air and space picture. Its mission was to detect and process any threats to the U.S. or Canada and direct a response while notifying the National Command Authority in both countries as necessary. NORAD's C3 center was moved inside Cheyenne Mountain, Colorado in 1961.<sup>32</sup>

<sup>30</sup> Dawson, 10.

<sup>31</sup> Schaffel, 58.

<sup>32</sup> NORAD, "NORAD History," <http://www.norad.mil/about/history.html> (accessed 25 August 2008).

NORAD was initially assigned over 250,000 personnel and consisted of 8 regions, 22 air division (including 2000 fighter and support aircraft), 65 fighter/interceptor squadrons (see Figure 3), 14 air defense artillery gun batteries, 253 air defense missile batteries, and 462 early warning radar and control stations.<sup>33</sup>

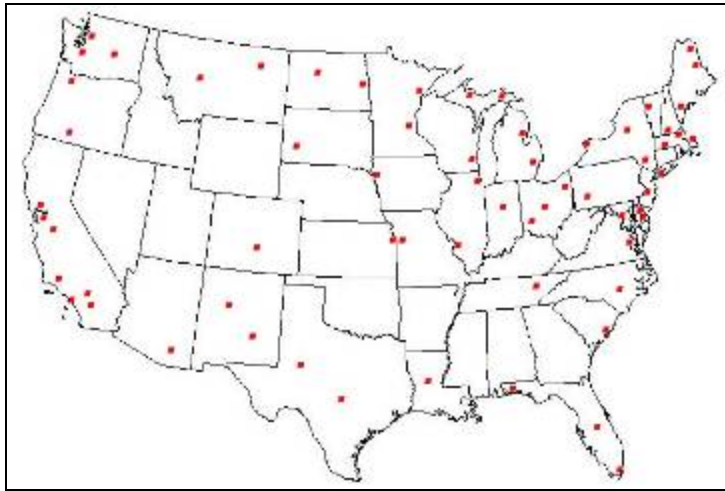


Figure 3. Cold War ADC Fighter Bases<sup>34</sup>

#### 4. The Decline of ADC and NORAD (1964-1989)

NORAD grew in importance and sophistication but their emphasis shifted as the primary threat changed from long-range bombers to strategic defense against inter-continental ballistic missiles (ICBMs) in the early 1960s. The Air Defense Command was reduced in size during this period due to the shift in threats and competition for funding. Secretary of Defense Robert McNamara's "economic moves to pay for U.S. involvement in Vietnam" played a role in the decline of America's homeland air defense network against conventional air attacks.<sup>35</sup> ADC continued to decline over the next 20 years as they transitioned to a surveillance mission (mostly with satellites) and became to the "Coast Guard of the Air."<sup>36</sup> ADC's surveillance mission was responsible for deterring

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<sup>33</sup> Dawson, 12.

<sup>34</sup> Wikimedia Foundation, Inc. "ADC," [http://en.wikipedia.org/wiki/Air\\_Defense\\_Command](http://en.wikipedia.org/wiki/Air_Defense_Command) (accessed 23 August 2008).

<sup>35</sup> Dawson, 10.

<sup>36</sup> Dawson, 52-55.

unauthorized flights in U.S. airspace and early warning of ICBM attacks.<sup>37</sup> By early 1980, ADC had closed its military radars and started using the Federal Aviation Administration's (FAA) radars as a substitute.<sup>38</sup> ADC was deactivated on July 1, 1980.<sup>39</sup> Its fighters "were divided between the Air Force's Tactical Air Command (TAC), Strategic Air Command (SAC)" and NORAD.<sup>40</sup> The ADC turned over all their surveillance, air defense and fighter-interceptor responsibilities to NORAD.<sup>41</sup> The decline of conventional air defense in America continued and by 1985, NORAD had only 55,000 personnel with five dedicated interceptor squadrons assigned to the command with augmentation from 11 ANG fighter squadrons.<sup>42</sup>

## **5. NORAD in the Post Cold War and the Rise of the ANG (1990-2001)**

NORAD continued to focus on aerospace warning and control over the U.S. and Canada even after the fall of the Berlin Wall and the final disintegration of the Soviet threat.<sup>43</sup> NORAD directed three subordinate regional headquarters: the Continental U.S. Region (CONR) headquartered at Tyndall AFB, Florida, the Alaska Region with its headquarters at Elmendorf AFB, and the Canadian Region controlled out of the Canadian Forces Base Winnipeg, Manitoba.<sup>44</sup> Canada's participation in NORAD was limited after the collapse of the Soviet Union due to budget constraints and internal political pressure. "By the early 1990s, the Air National Guard handled 90% of the air defense mission" in North America while NORAD struggled to justify their existence and maintain their \$500 million per year in funding for the staffing of their headquarters and for fighter alert facilities.<sup>45</sup>

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<sup>37</sup> Dawson, 52-55.

<sup>38</sup> Owen E. Jensen, "The Years of Decline: Air Defense from 1960 to 1980," *Strategic Air Defense*, (Wilmington, Del.: Scholarly Resources Imprint, 1989), 32, 40.

<sup>39</sup> Ibid

<sup>40</sup> Boyne, 6.

<sup>41</sup> Jensen, 40.

<sup>42</sup> Douglas Murray, "NORAD and U.S. Nuclear Operations," in *Fifty Years*, 220.

<sup>43</sup> NORAD, "About NORAD," <http://www.norad.mil/> (accessed 26 May 2008).

<sup>44</sup> NORAD.

<sup>45</sup> 1<sup>st</sup> Air Force.

The Defense Authorization Act of 1989 shifted the focus of the ANG air defense fighter forces from defending against Soviet bomber attacks to the U.S. “War on Drugs.”<sup>46</sup> NORAD used their radar network, C3 facilities, and fighter aircraft to assist civilian law enforcement agencies in the detection, tracking, and monitoring of suspected drug smugglers trying to enter North America.<sup>47</sup> The U.S. military is prohibited under federal law and DoD Directive 5525.5 from engaging in law enforcement activities, but NORAD was able to provide intelligence and location information to civilian law enforcement agencies by scrambling fighters to intercept and identify suspect aircraft entering the U.S.<sup>48</sup> The cost-benefit of this air defense mission is questionable as drug traffickers, like terrorists, are resourceful and innovative and can easily change tactics to counter our defenses. For example, only about 10% of the 880 aircraft intercepted in 1994 were actually smuggling drugs while “some agencies estimate that only about 5% of the drugs coming into the country arrive by air.”<sup>49</sup> Most of the planes intercepted by NORAD are simply aircraft with wrong transponder identification “squawks,” pilots off course or unable to respond because of a malfunctioning radios, or misfiled flight plans.<sup>50</sup>

The Air National Guard officially took command of NORAD’s CONR and the 1<sup>st</sup> Air Force (1 AF) located at Tyndall AFB, FL in October 1997, after years of debate about the roles and responsibilities of the ANG at home. The 1 AF became the first ANG numbered air force responsible for executing the air defense mission in North America.<sup>51</sup>

Budget cuts in the ‘90s forced NORAD and the ANG to continue to scale back their alert fighter forces. The CONUS rapid response fighter force consisted of only 14 aircraft at seven bases sitting at 15 minute ground alert on 9/11 (see Figure 4).<sup>52</sup>

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<sup>46</sup> Pat McKenna, “The Border Guards-NORAD: The eyes and ears of North America,” *Airman* 40, no. 1 (1 January 1996), 7.

<sup>47</sup> Sue McMillin, “NORAD adding its muscle to the fight against drugs,” *Air Force Times*, 24 September 2001, 25.

<sup>48</sup> McMillin, 25.

<sup>49</sup> McKenna, 7.

<sup>50</sup> McEnna, 7.

<sup>51</sup> 1<sup>st</sup> Air Force History.

<sup>52</sup> Bradley Graham, “Eagle Eyes Over the Homeland: False Alarms, Big Threat Keep U.S. Air Defenses Busy,” *The Washington Post*, 30 October 2001, 1.

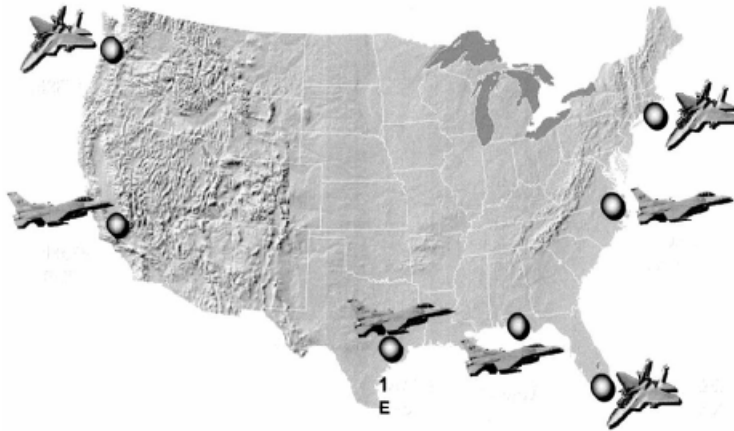


Figure 4. CONR's Alert Bases on 11 September 2001<sup>53</sup>

## B. CONCLUSION

Operation Noble Eagle is a “steady state NORAD mission” according to Col Herb Brown the from the U.S. Air Force Homeland Defense office in the Pentagon.<sup>54</sup> It is clear from this short review of the history of air defense in America that our past has been anything but “steady state” when it comes to this unique and important mission.

We have seen the rise and fall of air defense in America over the last 68 years. The mission has evolved and changed along with the threats to our nation, the political will of our leadership, and funding. We have seen air defense grow from a concept on paper in 1940 to four numbered air forces by 1942 and then back to a single headquarters organization with no assigned aircraft or pilots by 1946. Air defense grew again in the 1950s to over 2000 assigned aircraft (1500 interceptors/fighters) to counter the Soviet bomber threat. Conventional air defense then shrunk back down to only fourteen fighters sitting on alert to help fight the “War on Drugs” by September 2001.

Change is inevitable. The next chapter will analyze NORAD's performance on 9/11 and chronicle the evolution of Operation Noble Eagle over the last seven years.

<sup>53</sup> CONAR, “Operation Noble Eagle,” Briefing from First Air Force, CONUS NORAD Region, Tyndall AFB, FL.

<sup>54</sup> Herb Brown, Col, USAF, “USAF Support to Homeland Defense and Civil Support” presentation given to the Homeland Security students at the Naval Postgraduate School, Monterey, CA. (5 February 2008).

### **III. U.S. AIR DEFENSE AFTER SEPTEMBER 2001**

#### **A. NORAD'S FAILURES ON 9/11**

NORAD is a bi-national (United States and Canadian) organization charged with providing aerospace warning and control for North America. Aerospace warning includes the monitoring and alert of attack against North America by aircraft, missiles, or space vehicles. Aerospace control ensures air sovereignty and air defense of Canada and the United States.<sup>55</sup>

On the morning of 11 September 2001, nineteen al-Qaida terrorists successfully hijacked four fully fueled U.S. transcontinental airliners and turned them into cruise missiles. They successfully carried out a masterfully simple yet effective surprise attack on America and caught our nation's air defense forces completely off guard.

According to Gen Ralph Eberhart, the Commander of NORAD on 9/11 "our air defense posture was aligned to 'look outward' to counter external threats to North America."<sup>56</sup> In accordance with DoD directives in effect on 9/11, NORAD was required to monitor and report the actions of any hijacked aircraft if requested by the Federal Aviation Administration (FAA). DoD's role was simply to support the civilian agencies in the event of a hijacking. Eberhart said, "we had procedures for potential hijackings, which were based on the premise that hijacked aircraft would be used for ransom or political purposes, not as a weapon."<sup>57</sup>

The biggest issue for NORAD was the sheer size of the area they were assigned to defend with only fourteen aircraft spread out around the country. The Northeastern United States was protected by four alert fighters at two bases on September 2001. NORAD had two alert fighters at Otis AFB in Cape Cod, MA and another two at Langley

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<sup>55</sup> About NORAD, <http://www.norad.mil/about/index.html> (accessed 9 May 08).

<sup>56</sup> Statement before the National Commission on Terrorist Attack upon the U.S., 17 June 2004, [http://www.9-11commission.gov/hearings/hearing12/eberhart\\_statement.pdf](http://www.9-11commission.gov/hearings/hearing12/eberhart_statement.pdf) (accessed 9 May 08).

<sup>57</sup> Statement before the National Commission on Terrorist Attack upon the U.S., 17 June 2004, [http://www.9-11commission.gov/hearings/hearing12/eberhart\\_statement.pdf](http://www.9-11commission.gov/hearings/hearing12/eberhart_statement.pdf) (accessed 9 May 08).



AFB in Hampton, VA. These aircraft were controlled by the North East Air Defense Sector (NEADS) headquartered in Rome, NY. NEADS had an area of responsibility (AOR) covering over one million square miles.<sup>58</sup>



Figure 5. NEADS Reporting Structure on 9/11<sup>59</sup>

In 2001, like NORAD, NEADS was still focused outward, looking Cold War era bomber attacks and drug runners. NORAD and NEADS had become a bit complacent after the fall of the Soviet Union and their focus was on the wrong threat, even though al-Qaida terrorist threats were well known in the 1990s and intelligence estimates discussed the possibility of hijacked aircraft being used as cruise missiles.<sup>60</sup>

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<sup>58</sup> NEADS Mission, <http://www.neads.ang.af.mil/neadsMission.htm> (accessed 9 May 08).

<sup>59</sup> "9/11 Commission Staff Statement," *National Commission on Terrorist Attacks Upon the United States*, 21 August 2004, [http://govinfo.library.unt.edu/911/report/911Report\\_Ch1.htm](http://govinfo.library.unt.edu/911/report/911Report_Ch1.htm) (accessed 16 September 2008).

<sup>60</sup> "9/11 Commission Staff Statement," *National Commission on Terrorist Attacks Upon the United States*, 21 August 2004, [http://govinfo.library.unt.edu/911/report/911Report\\_Ch1.htm](http://govinfo.library.unt.edu/911/report/911Report_Ch1.htm) (accessed 16 September 2008).

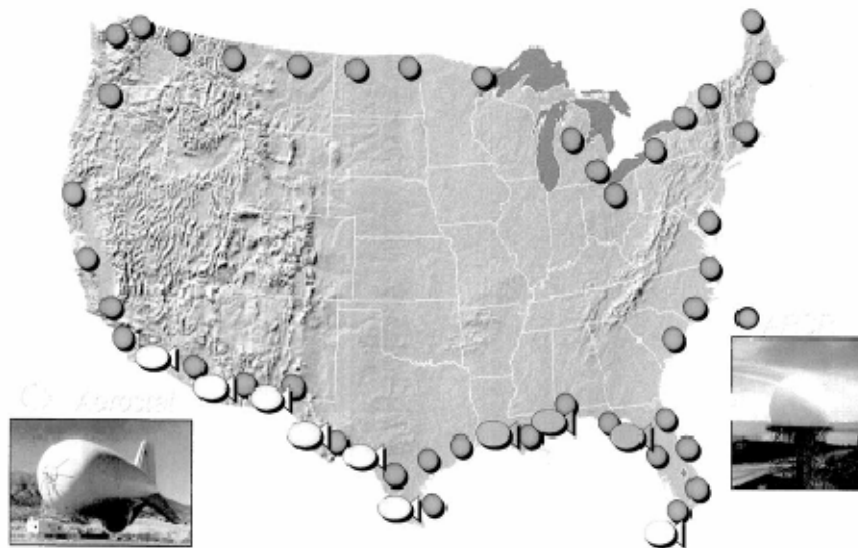


Figure 6. CONR's Sensors on 11 September 2001<sup>61</sup>

Al-Qaida's attack took advantage of the poor security measures and the massive amount of lightly defended airspace. They had countless targets of opportunity in the densely populated cities throughout the North East and chose to split their attacks between New York and Washington D.C., making it more difficult for NORAD to anticipate their next move.

Al-Qaida also chose to execute their attack in a very dense air traffic area. There were more than 4,000 aircraft airborne over the U.S. on the morning of 9/11 and more than 1,000 of them were in the Northeast.<sup>62</sup> This made it more difficult for NORAD's antiquated air defense systems to find and track the hijacked aircraft amongst all the other air traffic (see Figure 7). The hijackers further complicated the situation for NORAD and the FAA by turning off the transponder beacons on the hijacked aircraft and descending below reliable radar coverage.<sup>63</sup>

<sup>61</sup> CONAR, "Operation Noble Eagle," Briefing from First Air Force, CONUS NORAD Region, Tyndall AFB.

<sup>62</sup> Michael Bronner, 9/11 Live: The NORAD Tapes, Vanity Fair, August 2006, <http://www.vanityfair.com/politics/features/2006/08/norad200608?currentPage=1> (accessed 9 May 08).

<sup>63</sup> Ibid.



Figure 7. Aircraft aloft on morning of 11 September 2001<sup>64</sup>

At 08:14 on the morning of 9/11, an Egyptian and four Saudis hijacked American Airlines Flight 11 (AA-11). Boston air traffic control center finally notified NEADS of the hijacking at 08:32 and requested “military assistance” in the vicinity of New York City.<sup>65</sup> NEADS delayed the scramble while trying to locate AA-11 on their radar scopes. They finally gave the order to launch the two F-15 Eagles from Cape Cod, MA (Otis AFB) to a point over Manhattan at 08:45. At 08:46:40, AA-11 hit the north tower of the World Trade Center (WTC).<sup>66</sup> The Otis AFB, Eagles were in the air by 08:53 and inbound to New York City when United Airlines Flight 175 hit the south tower of the WTC at 09:03:11.<sup>67</sup>

Cape Cod, MA is approximately 200 miles from New York City and Hampton, VA is about 130 miles from Washington DC. Even at top speed, it would have taken the fighters 20-30 minutes from the scramble order to get into an effective defensive position near the intended target areas.

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<sup>64</sup> CONAR, “Operation Noble Eagle,” Briefing from First Air Force, CONUS NORAD Region, Tyndall AFB.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

The lack of prior planning for such an attack, poor equipment, poor communication, and poor coordination within and among all federal agencies continued to compound the confusion and hampered the efforts for the rest of that fateful day.

At 09:21, Boston Center saw a false radar track on their radar scope heading south from New York City towards Washington D.C. and advised NEADS that AA-11 was still airborne and heading toward the capital. NEADS scrambled the two F-16 Falcons from Langley AFB at 09:24 to fly to D.C. and search for the American Airlines flight. Unfortunately, the mission instructions were not clearly communicated to the fighter pilots before takeoff, and NEADS could not establish direct radio contact with the jets because they were too low and too far away.<sup>68</sup> The F-16s were in the air by 09:34 but the pilots followed their normal training flight plan out over the Atlantic Ocean to set up defensive CAPs approximately 60 miles off the east coast – “a plan dating from the Cold War.”<sup>69</sup> One of the pilots later told the 9/11 commission that he “reverted to the Russian threat – I was thinking it was a cruise-missile attack from the ocean.”<sup>70</sup>

Meanwhile, American Airlines Flight 77 (AA-77) had taken off from Dulles Airport at 08:20. The Federal Aviation Administration (FAA) informed NEADS that flight was “missing” at 09:34. AA-77 crashed into the Pentagon at 09:37:46 while the F-16s were over 150 miles away and going the wrong direction.<sup>71</sup> It was almost 10:00 by the time NEADS finally got control of the F-16s and vectored them into a defensive CAP over the National Capital Region (NCR).<sup>72</sup>

United Airlines Flight 93 (UA-93) took off from Newark, NJ at 08:42. The FAA was aware this jet was hijacked at 09:34 but did not inform NEADS until 10:07. 10:07 was about ten minutes after the passengers of UA-93 had revolted against the terrorists and four minutes after the plane crashed into a field near Shanksville, PA (at 10:03).<sup>73</sup>

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<sup>68</sup> CONAR.

<sup>69</sup> Ibid.

<sup>70</sup> Bronner.

<sup>71</sup> 9/11 Commission Staff Statement.

<sup>72</sup> Bronner.

<sup>73</sup> Ibid

Even if the fighters had been on station in the CAP over Washington D.C., they did not have authority to shoot the airliners down under the standing peace-time rules of engagement (ROE). That authority needed to come from the President but actually came first from the Vice President in the White House bunker at 10:19.<sup>74</sup> The shoot-down order was passed from the White House to the NORAD command center in Cheyenne Mountain, Colorado and then forwarded to the Continental United States NORAD Region (CONR) at Tyndall AFB, FL. Major General Larry Arnold was the ANG's commander of 1<sup>st</sup> Air Force and CONR at the time. He was responsible for the command, control, and communication (C3) of the air defense fighter forces around the country. He instructed his staff to broadcast the following message to NEADS over the command's instant messaging "chat" system: "10:31, Vice President has cleared us to intercept tracks of interest and shoot them down if they do not respond per General Arnold."<sup>75</sup> The instant message confused the controllers at NEADS and they failed to clarify or pass the order on to the pilots in the CAPs because "they were unsure how the pilots would, or should, proceed with this guidance."<sup>76</sup> In short, while the national leadership in Washington believed that the fighters above them had been instructed to "take out" the hijacked airliners, the only order actually conveyed to the pilots by NEADS was to "ID type and tail" which is standard ROE for peacetime operations.<sup>77</sup>

It is very doubtful that the F-16s in the CAP over Washington D.C. would have been able to stop UA-93 had it continued toward the capital. The hijackers had turned the aircraft transponder off and NEADS did not find out about the hijacking of UA-93 until 10:07. The hijacked aircraft would have arrived over D.C. at approximately 10:23.<sup>78</sup> The shoot down authority was not transmitted to NEADS until 10:31, almost an hour and forty-four minutes after the first plane hit the World Trade Center.

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<sup>74</sup> Bronner.

<sup>75</sup> Ibid.

<sup>76</sup> Ibid.

<sup>77</sup> Ibid.

<sup>78</sup> 9/11 Commission Staff Statement.

The 9/11 Commission later accused Major General Arnold of deliberately making false statements in the aftermath of 9/11 to “obscure the mistakes on the part of the military and to overstate the readiness of the military (NORAD) to intercept and, if necessary, shoot down UA-93.”<sup>79</sup> The Pentagon’s inspector general’s office investigated the accusations in 2004 but the results were not released and are still “classified.”<sup>80</sup>

The surprise and unpredictability of the 9/11 attacks kept our air defense forces reeling. It is clear that NORAD lacked sufficient planning, training, and forces to effectively defend their assigned area of responsibility. Four fighters on alert at only two bases in the Northeast, along with the poor C3 and coupled with fifty years of training for a high altitude bomber and cruise missile attacks from the ocean made it very difficult for NORAD to flex their operations real time to deal with a surprise asymmetric terrorist attack from within the U.S. borders. NORADs lack of situational awareness (SA) prevented our air defense system from being able to intercept and prevent any of the 9/11 attacks.

NORAD also lacked additional armed fighters in reserve or air refueling tankers on alert to help keep the fighters airborne in the CAPs. A third ‘spare’ jet configured for training took off from the alert site at Langley AFB, VA for D.C. but it was unarmed and lacked sufficient fuel to remain on station.<sup>81</sup> NORAD did not have any contingency plans in place for additional aircraft support. It took several hours after the attack to coordinate with other ANG and active duty fighter squadrons along with air refueling tankers and airborne warning and control system (AWACS) bases to organize the necessary combat power. Dozens of squadrons around the country eventually armed their jets and scrambled over 300 aircraft during the 24 hours following the attacks.<sup>82</sup>

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<sup>79</sup> Bronner.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

<sup>82</sup> Bronner.

The fighters flew 24 hour-a-day defensive air patrols over New York City, Washington, D.C. and many other major American cities for the next six months.<sup>83</sup> NORAD's post 9/11 effort was the birth of the Operation Noble Eagle that still continues today.

## **B. THE EVOLUTION OF OPERATION NOBLE EAGLE**

The military insisted on helping to protect the centers of “American political, governmental, and economic activity” in New York City and Washington D.C. immediately after the 9/11 attacks with 24 hour CAPs.<sup>84</sup> It was critical that NORAD not make the same mistakes again so additional random CAPs were flown over other cities and critical infrastructure around the country. President George W. Bush authorized the mobilization of thousands of ANG and reservists immediately after 9/11 for homeland defense and civil support in response to the terrorist attacks. This mission was called Operation Noble Eagle (ONE) and was intended to be an emergency stop-gap air defense measure “anchored by combat air patrols.”<sup>85</sup> There were up to 130 fighters, 75 tankers, and 15 E-3 Airborne Warning and Control System (AWACS) aircraft in the air over America every day supporting as many as 30 CAPs.<sup>86</sup> Each aircraft flew four-to-six hour sorties.<sup>87</sup> By mid-December 2001, the Air Force was spending over \$200 million a month and had flown over 10,000 sorties in support of the domestic air defense operation.<sup>88</sup> The USAF's homeland effort had “eclipsed the number of sorties flown in support of the war in Afghanistan.”<sup>89</sup> By March 2002, NORAD and the ANG's 1<sup>st</sup> Air Force had reactivated more than 30 former Cold War alert bases around the country.<sup>90</sup> The active duty Air Force had consumed its entire annual flying hour budget half way

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<sup>83</sup> Bronner.

<sup>84</sup> John A. Tirpak, “Airpower for the Long Haul,” *Air Force Magazine*, (March 2002), 54-58

<sup>85</sup> Global Security, “Operation Noble Eagle,” *GlobalSecurity.org*, April 27, 2005, [www.globalsecurity.org/military/ops/noble-eagle.htm](http://www.globalsecurity.org/military/ops/noble-eagle.htm) (accessed 25 April 2008).

<sup>86</sup> Tirpak, 55.

<sup>87</sup> Ibid.

<sup>88</sup> Ibid.

<sup>89</sup> Ibid.

<sup>90</sup> Tirpak, 55.

through the fiscal year supporting the CAPs.<sup>91</sup> Pilot's combat proficiency was beginning to deteriorate as training tapered off and the service was burning up its supply of spare parts while jets were "stacked up in depot maintenance" for required inspections and overhauls.<sup>92</sup>

U.S. Northern Command (USNORTHCOM) was formed in October 2002 to consolidate command and control of DoD's homeland defense and civil support efforts.<sup>93</sup> USNORTHCOM's area of responsibility (AOR) "includes air, land and sea approaches and encompasses the continental United States, Alaska, Canada, Mexico and the surrounding water out to approximately 500 nautical miles."<sup>94</sup> The commander of USNORTHCOM is also 'dual-hated' as the commander of NORAD. He is primarily responsible for Operation Noble Eagle and its impact on the Air Force.

It became clear to USNORTHCOM and Air Force leadership that the global war on terrorism would be a long fight at home and abroad. The nonstop Noble Eagle CAPs were putting a "major strain on pilots, aircraft, maintainers, and the military budget."<sup>95</sup> Some early funding for ONE came from supplemental "war on terror" accounts but that money eventually dried up and the missions started to be funded from the normal USAF operations and maintenance (O&M) budget.<sup>96</sup> The Air Force began to look for more "cost-effective ways to defend America and settled on a plan based on increased air sovereignty alert (ASA), supplemented by random and 'threat-based' air patrols" along with improved surveillance and command, control, communication capability (C3).<sup>97</sup>

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<sup>91</sup> Hebert, 44.

<sup>92</sup> Tirpak, 56.

<sup>93</sup> U.S. Northern Command, "About USNORTHCOM," <http://www.northcom.mil/About/index.html> (accessed 14 October 2008).

<sup>94</sup> Ibid.

<sup>95</sup> Hebert, 43.

<sup>96</sup> "One Step Forward, Two Steps Back," *airforce-magazine.com*, (2 June 2007), <http://www.airforce-magazine.com/DRArchive/Pages/2007/February%202007/February%2006%202007/1030forward.aspx> (accessed 14 October 2008).

<sup>97</sup> Hebert, 43.



## **1. ONE Air Sovereignty Alert**

NORAD eventually settled for 18 steady-state ANG alert sites around the country.<sup>98</sup> They keep a minimum of 32 fighters (plus 16 spare jets), along with eight refueling tankers, and two AWACS aircraft on constant alert.<sup>99</sup> These alert jets can be in the air in as little as five minutes depending on the threat level and air sovereignty alert posture. The ONE mission has been popular with ANG squadrons who were in jeopardy of being closed down by the Base Closure and Realignment Commission (BRAC). The ANG saw a significant reduction in their air defense mission and funding in the 1990s. After 9/11, they realized they could contribute to the new homeland security mission and have seen significant increases in their budgets and personnel. “Compared to mid-2001, the ANG has more than five times as many airmen devoted to the alert mission.”<sup>100</sup>

The 121<sup>st</sup> Fighter Squadron (FS) at Andrews AFB, MD is a good example of the expanded role and increase in personnel for the ANG since 9/11. The squadron has about 32 pilots. Before 9/11, 26 of them were traditional, part-time “drilling” Guardsmen with only six full-time pilot slots.<sup>101</sup> The ratio has reversed as the squadron’s increased budget authorization allows them to have 25 full-time pilots on the payroll.<sup>102</sup> The ‘new’ mission has helped many pilots and crews who were furloughed from their airlines jobs after 9/11 or those who just wanted to take a leave of absence from their civilian jobs to come back in the Air Force. The pay, stability, and benefits (including retirement) for full-time Guard alert personnel is very appealing.

The ANG is using the additional funding and political support to increase the number of primary assigned aircraft (PAA), hire more support airmen, and upgrade their aircraft with new equipment. Many of the ANG alert squadrons have gone from 15 to 18

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<sup>98</sup> Tamar A. Mehuron, Associate Editor, “USAF Almanac 2005,” Air Force Magazine, May 2005, 70.

<sup>99</sup> Mehuron, 70.

<sup>100</sup> Hebert, 36.

<sup>101</sup> Ibid.

<sup>102</sup> Ibid.

PAA while some of the recent upgrades for their fighters have included the new AIM-9X Sidewinder missile, the Joint Helmet Sighting System (JHMCS), Tactical Data Link (Link 16), and Active Electronically Scanned Array (AESA) radars.

NORAD's alert fighters have received over 2000 scramble orders since 9/11 in response to targets of interest (TOI) around the country.<sup>103</sup> The majority of these scrambles were simply for general aviation pilots who were off course, on the wrong radio frequency, squawking the wrong transponder code, or did not file a proper flight plan.<sup>104</sup> Most of the incidents specifically in the Washington D.C. area were resolved before the fighters got airborne and resulted in only a handful of actual intercepts.<sup>105</sup>

## **2. ONE Combat Air Patrols (CAPs)**

This research has not uncovered any stories since 9/11 of airborne TOIs that have actually been threats to the NCR or anywhere else in the country requiring an 'armed' fighter aircraft response. Despite all the 'false alarms,' the *alert* fighters do serve an important role in our nation's security and defense. However, Noble Eagle's combat air patrols are simply used as a show of force to deter another 9/11-type attack. NORAD schedules these "random" air defense deterrence missions over major U.S. population centers, nuclear and chemical sites, and pre-planned national events.

The ANG had over 640 fighter/attack aircraft (~32% of the Air Force's fleet) in 2001.<sup>106</sup> "To prevent the mission from becoming a total Air Guard burden," the active duty USAF aircraft helps fly the combat air patrols requiring a "known commitment."<sup>107</sup> The known commitments are referred by NORAD as National Special Security Events (NSSE). The Federal Aviation Administration (FAA) sets temporary flight restricted zones around these NSSEs that keep unauthorized aircraft anywhere from three to 30

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<sup>103</sup> Air Force Association (AFA), "Relentless Vigil," *airforce-magazine.com*, <http://www.airforce-magazine.com/DRArchive/Pages/2008/May%202008/May%2020%202008/RelentlessVigil.aspx> (accessed 14 October 2008).

<sup>104</sup> Ibid.

<sup>105</sup> Ibid.

<sup>106</sup> AFA, "2001 USAF Almanac," *Air Force Magazine*, May 2001, 96.

<sup>107</sup> Hebert, 38.

miles away (see Figure 8). The NSSEs include President of the United States (POTUS) movements, political gatherings like the Democratic National Convention, large sporting events such as the Super Bowl, and other occasions that attract widespread attention, for example, space shuttle launches.<sup>108</sup>

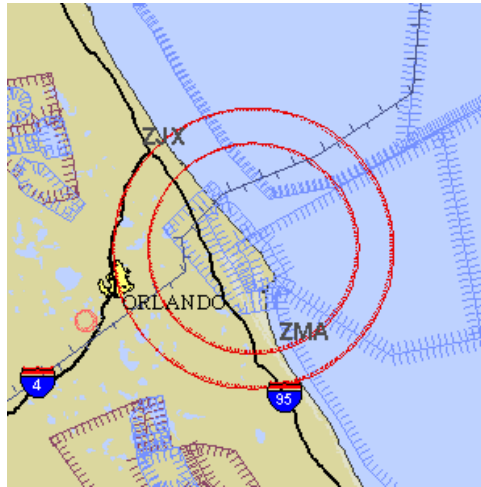


Figure 8. Cape Canaveral Temporary Flight Restriction (TFR).<sup>109</sup>

In August 2007, the Air National Guard-led 1<sup>st</sup> Air Force, in its U.S. Continental NORAD Region role tasked two active duty fighter wings for one of the many and varied annual NSSEs. The 33<sup>rd</sup> Fighter Wing (FW) at Eglin AFB, Florida, and the 388<sup>th</sup> FW at Hill AFB, Utah were assigned the mission of patrolling central Florida with their F-15s and F-16s in preparation for the space shuttle launch on mission STS-118.<sup>110</sup> The Wing's deployed jets, pilots, support personnel, and equipment at a significant cost to support the mission. The fighters were tasked to "make low passes over the area tourist attractions, airports, and the Kennedy Space Center."<sup>111</sup> Additional low passes were flown over Disney World, Universal Studios Orlando, and Daytona Beach International

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<sup>108</sup> Adam J. Hebert, "Homeland Defense," *Air Force Magazine*, November 2001, [www.afa.org/magazine/nov2001/1101homeland.asp](http://www.afa.org/magazine/nov2001/1101homeland.asp) (accessed 2 November 2007).

<sup>109</sup> NORCOM, "NORAD and USNORTHCOM Support Space Shuttle Launch," <http://www.northcom.mil/News/2008/111008.html> (accessed 2 November 2008).

<sup>110</sup> AFA, "Noble Eagle Ramps Up for Shuttle," *airforce-magazine.com*, <http://www.airforce-magazine.com/DRArchive/Pages/2007/August%202007/August%2003%202007/1030noble.aspx> (accessed 14 October 2008).

<sup>111</sup> Ibid.

Speedway with air-refueling support provided by KC-135 Stratotankers from the 186<sup>th</sup> Air Refueling Wing in Meridian, Mississippi.<sup>112</sup> ANG Maj. Gen. Hank Morrow, the 1<sup>st</sup> AF Commander said “there’s been no specific threat but Americans should *view* the air defense deterrence measures.”<sup>113</sup>

It is difficult to understand how costly “saber rattling” air patrol missions like these can be justified without any credible intelligence about a specific airborne threat.<sup>114</sup> Especially in light of rising fuel costs, shrinking budgets, low active-duty pilot experience rates, high operations tempos, and endless overseas deployments in support of operations in Afghanistan, Iraq, and elsewhere.



Figure 9. An F-15C in a CAP over the space shuttle.<sup>115</sup>

### 3. ONE Command, Control, and Communications (C3)

The Operation Noble Eagle alert and CAP missions are tasked and controlled by NORAD/USNORTHCOM’s 1AF located at Tyndall AFB, Florida. The Air National Guard commanded 1AF is also known as Air Forces Northern or AFNORTH for short. AFNORTH has a complicated command structure. They are the air component for USNORTHCOM and have the responsibility to command and employ aerospace power

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<sup>112</sup> 388th FW, “CONR Fighters Patrolling Central Florida,” *388<sup>th</sup> Fighter Wing*, <http://www.388fw.acc.af.mil/news/story.asp?id=123063154> (accessed 14 October 2008).

<sup>113</sup> Ibid.

<sup>114</sup> No credible open source intelligence indicating a threat to aviation requiring a fighter response has been found during this research. Intelligence reports reference threats in generic and vague terms.

<sup>115</sup> Google Pictures, [www.strategypage.com/.../cap\\_over\\_shuttle\\_1.jpg](http://www.strategypage.com/.../cap_over_shuttle_1.jpg) (accessed 1 November 2008).

within NORAD's CONR region.<sup>116</sup> 1AF is also one of the USAF Air Combat Command's (ACC) five numbered Air Forces.<sup>117</sup> ACC is responsible to organize, train, and equip units for the air defense and air sovereignty mission while the National Guard Bureau (NGB) is responsible for ensuring that 1AF is properly organized, trained, and resourced with military personnel and funding.<sup>118</sup>

The ANG and active duty relationship is "further complicated by the fact that most of 1AF's approximately 390 headquarters staff (up from 165 personnel in 2001) and over 2,300 support personnel are Guardsmen who remain in state status" (Title 32, U.S. Code) while performing their normal duties.<sup>119</sup> The air defense and air sovereignty mission is a federal responsibility so Guardsmen are "automatically converted to federal status (Title 10, U.S. Code) when actually conducting intercepts of unidentified aircraft in U.S. air space."<sup>120</sup>

The Operation Noble Eagle missions are planned and directed for CONR's two air defense sectors by AFNORTH/1AF's 601<sup>st</sup> Air and Space Operation Center (AOC). The AOC operates from their new 37,000 square foot, \$30 million facility.<sup>121</sup> The operations center began functioning in November 2006 at Tyndall AFB, FL when the Southeast Air Defense Sector (SEADS) shut down.<sup>122</sup> SEADS handed its air defense and sovereignty mission over to the Northeast Air Defense Sector (NEADS). NEADS is located in Rome, NY and now has responsibility for all alert and CAP missions east of the Mississippi River including the National Capital Region. NEADS was unofficially redesigned as the Eastern Air Defense Sector (EADS).

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<sup>116</sup> 1<sup>st</sup> Air Force, "AFNORTH MISSION," *1<sup>st</sup> Air Force*, <http://www.1af.acc.af.mil/library/factsheets/factsheet.asp?id=4107> (accessed 15 October 2008).

<sup>117</sup> Ibid.

<sup>118</sup> Global Security, "First Air Force" *GlobalSecurity.org*, <http://www.globalsecurity.org/military/agency/usaf/1af.htm> (accessed 15 October 2008).

<sup>119</sup> Ibid.

<sup>120</sup> Ibid.

<sup>121</sup> Ibid.

<sup>122</sup> 1<sup>st</sup> Air Force, "601<sup>st</sup> AOC" *1<sup>st</sup> Air Force*, <http://www.1af.acc.af.mil/units/601staoc/index.asp> (accessed 15 October 2008).

The Western Air Defense Sector (WADS) is located at McCord AFB, Washington and is staffed primarily by members of the Washington Air National Guard.<sup>123</sup> WADS is responsible for the security and integrity for approximately 1.9 million square miles of continental U.S. airspace west of the Mississippi River.<sup>124</sup>

Both WADS and EADS monitor their assigned airspace through an extensive network of radars and radios located throughout the United States. The network is known as the Joint Surveillance System and has been a significant improvement over pre-9/11 capabilities. It is a jointly funded program that is maintained by FAA personnel but used by both the DoD and the FAA. The sectors also use radar information from tethered aerostat balloons and “gap filler radars to improve low level coverage” along our southern borders.<sup>125</sup> The “radar data from all these sources is electronically fed into computers at the respective Sector Operations Control Centers where personnel correlate and identify all airborne targets and, if necessary, scramble alert fighters” or commit fighters from airborne CAPs to identify unknown or threatening TOIs.<sup>126</sup>



Figure 10. NORAD’s Improved Joint Surveillance System<sup>127</sup>

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<sup>123</sup> WADS, “Western Air Defense Sector” <http://wads.washingtonairguard.com/index.shtml> (accessed 15 October 2008).

<sup>124</sup> Ibid.

<sup>125</sup> Ibid.

<sup>126</sup> Ibid.

<sup>127</sup> CONR.

The 601<sup>st</sup> AOC generates a daily Air Tasking Order (ATO) based on higher headquarter requirements along with standard ONE alert commitments. The ATO assigns alert and CAP missions to ANG and active duty Air Force squadrons around the country. The AOC sends the ATO to EADS and WADS who in turn breakout the specific missions and forward the information to the tasked units for execution. EADS and WADS are the command and control agencies responsible for scrambling fighters, managing the daily CAPs, as well as relaying mission information back to the AOC. The AOC then passes the pertinent details to NORAD headquarters in Colorado Springs, CO and coordinates future taskings. The AOC also tasks the 121<sup>st</sup> FS from Andrews AFB for their alert commitment in Washington D.C. and schedules CAPs as required for the National Capital Region (NCR).

#### **4. National Capital Region**

The Joint Forces Headquarters National Capital Region in Ft. McNair, Washington, D.C. has a two star U.S. Army general in charge and is a subordinate command of USNORTHCOM. They coordinate with all DoD services to help protect our nations “political and military center of gravity.”<sup>128</sup>

The NCR uses a unique integrated air defense system (IADS) with both surface to air missiles (SAMs) and fighter aircraft. The fighters are controlled by NORAD’s Eastern Air Defense Sector while the SAMs are operated by the U.S. Army National Guard in coordination with NORAD.

The region also uses a ground-based laser visual warning system to alert unauthorized pilots who have flown into restricted airspace over the nation’s capital.<sup>129</sup> The alternating green and red eye-safe laser lights were developed in 2005 by the Air

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<sup>128</sup> NORTHCOM, “About USNORTHCOM,” *U.S. Northern Command*, <http://www.northcom.mil/About/index.html> (accessed 15 October 2008).

<sup>129</sup> Kathleen Koch, “Lasers warn pilots of restricted airspace,” *CNN.com*, (February 11, 2005), <http://edition.cnn.com/2005/TECH/02/11/laser.demo/> (accessed 15 October 2008).



Force's Rapid Capabilities Office.<sup>130</sup> NORAD wanted a more cost effective alternative to alert general aviation pilots of their airspace violations instead of scrambling alert fighters to intercept the unauthorized aircraft.

The scrambled fighters cost the USAF a lot of time and money. The jets are required to intercept and drop flares in front of the stray aircraft to let them know they have entered the Washington D.C. Air Defense Identification Zone (ADIZ) without authorization. The ADIZ extends for 30 miles around the Washington Monument and up to 18,000 feet (see Figure 11).<sup>131</sup>

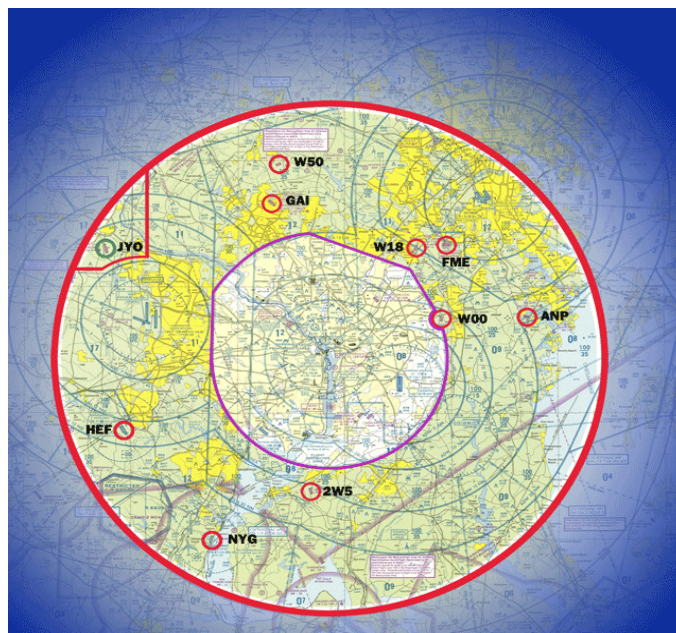


Figure 11. Washington D.C. ADIZ<sup>132</sup>

The Army National Guard has command and control over the NCR's ground based air defense systems. The mission is called Operation Clear Skies and has evolved into a complex network of offensive and defensive military and civil assets. Some of the equipment added since 9/11 including additional ground based Sentinel 3D phased array radar systems, heat seeking Stinger missiles, and the Norwegian Advanced Surface to Air

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<sup>130</sup> Koch.

<sup>131</sup> "Flight Operations in the Washington, D.C. ADIZ," AOPA Online, <http://www.aopa.org/adiz/adiz.html> (accessed 15 October 2008).

<sup>132</sup> AOPA.



Missile (NASAM) system employing the U.S. made AIM-120 Advanced Medium Ranged Air-to-Air Missile (AMRAAM).<sup>133</sup> These systems will be covered in more detail in Chapter VI.

### C. CONCLUSION

The 9/11 National Commission on Terrorist Attacks upon the United States cited the “failure of imagination” on the part of U.S. officials that contributed the nation vulnerability to attack.<sup>134</sup> It is clear now that NORAD made mistakes on 9/11 but their real failure occurred during the budget battles of 1990’s when they persisted in focusing their limited air defense efforts on external Soviet-style bomber attacks. The Berlin Wall fell in 1989 and the Soviet Union dissolved in 1991. NORAD’s “failure of imagination” in the 10-12 years that preceded the 9/11 attacks was the root cause for their mistakes on that day. NORAD’s failure to anticipate realistic current and future threats contributed to their inability to respond effectively to the hijacked aircraft once they were turned into attack missiles. This “new” threat contained over 10,000 gallons of jet fuel and was employed by a known terrorist organization.

NORAD does not want to make the same mistakes again and has invested billions of dollars and countless hours in improving the nation’s air defense system. They increased the number of alert fighters, added airborne combat air patrols, significantly improving their command and control system, and took drastic steps to protect our nation’s capital with an integrated air defense system. NORAD must be careful to not focus too much of their efforts on deterring another attack employing hijacked aircraft. The CAPs especially cost a great deal in terms of money, time, and reduced combat

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<sup>133</sup> Sgt W. Michael Houk, “Army Guard Takes Charge of National Capital Region’s Air Defense,” Air Defense Artillery Online (14 December 2006), <http://www.airdefenseartillery.com/online/December%202006/Guard%20Homeland%20Air%20Defense.htm> (accessed 15 October 2008).

<sup>134</sup> John King and Elaine Quijano, “9/11 Panel Report: We Must Act,” CNN.com (23 July 2004), <http://www.cnn.com/2004/ALLPOLITICS/07/22/911.report/> (accessed 16 October 2008).

capability for our aircrews while the utility of these CAPs and their effectiveness is questionable given the lack of actionable intelligence and the improvements in aviation security.

The next chapter will evaluate the threats to aviation in America and review the security improvements made to minimize the risk of another 9/11.

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## **IV. PROTECTING THE U.S. AVIATION INDUSTRY POST 9/11**

### **A. THE IMPACT OF 9/11 ON AIR TRAVEL**

Over 600 million people fly on our nation's airlines each year.<sup>135</sup> The 9/11 attacks hit the airline industry harder than any other critical industry in the United States. "Security Control of Air Traffic and Navigational Aids" (SCATANA) was declared for the first time in the nation's history, and our entire airspace system was shutdown. Hundreds of aircraft taxiing for takeoff were ordered back to the terminals at over 450 airports around the country.<sup>136</sup> By 9:25 am on that fateful morning, 4,452 airborne airplanes were directed to land at the nearest airports and no international flights were allowed to enter U.S. airspace.<sup>137</sup> Armed military fighter jets roamed freely in the skies over the country for four days as our nation's airspace remained closed.

The forced shutdown severely impacted an airline industry that was already struggling financially. The industry saw a drastic reduction in passenger loads (demand) after 9/11 causing a number of companies to go out of business or declared bankruptcy. Almost 160,000 employees were laid off or furloughed and the airlines mothballed almost 1,000 airplanes in the Arizona desert.<sup>138</sup> The airlines lost an estimated \$1.4 billion during the four-day airspace shutdown and hemorrhaged an estimated \$40 billion by 2006.<sup>139</sup>

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<sup>135</sup> Transportation Security Administration (TSA), [http://www.tsa.gov/who\\_we\\_are/what\\_is\\_tsa.shtm](http://www.tsa.gov/who_we_are/what_is_tsa.shtm) (accessed 29 August 2008).

<sup>136</sup> Laurence Zuckerman, "A Day of Terror: The Airlines," *The New York Times*, (12 September 2001).

<sup>137</sup> Alan Levin, "Part 1: Terror attacks brought drastic decision: Clear the Skies," *USA Today*, (12 August 2002).

<sup>138</sup> U.S. Department of Transportation, "Airline Travel Since 9/11," [http://www.bts.gov/publications/issue\\_briefs/number\\_13/html/entire.html](http://www.bts.gov/publications/issue_briefs/number_13/html/entire.html) (accessed 28 August 2008).

<sup>139</sup> Gail Makinen, "The Economic Effects of 9/11: A Retrospective Assessment," *CRS*, (27 September 2002), CRS 30.

The federal government immediately offered \$5 billion in grants and \$10 billion in loan guarantees to the airlines to help cover their losses as a result of the terrorist attacks.<sup>140</sup> This was just a short-term fix. More was needed to improve safety and restore the confidence of the flying public.

Significant measures were taken to overhaul our nation's intelligence community (IC) and aviation security. Twenty layers of security were added to protect our air transportation system from terrorists (see Figure 12). This chapter will review key intelligence and security improvements and offer a risk assessment of the chance of another aircraft hijacking of a kind that would call for an armed fighter response. The chapter will *not* address the risk of having an airliner blown up or shot down because Operation Noble Eagle and armed fighters do little to mitigate those threats.

## 20 Layers of Security

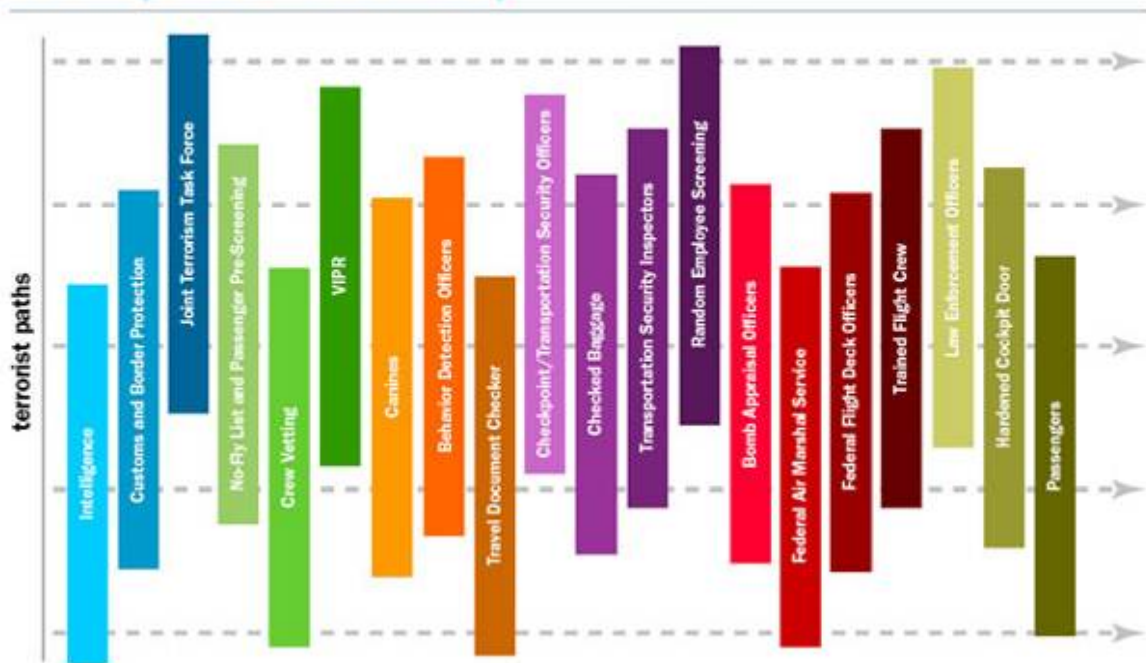


Figure 12. “20 Layers of Security”<sup>141</sup>

<sup>140</sup> Makinen, CRS 30.

<sup>141</sup> TSA, [http://www.tsa.gov/what\\_we\\_do/layers/index.shtm](http://www.tsa.gov/what_we_do/layers/index.shtm) (accessed 29 August 2008).

## **B. CHANGES IN THE INTELLIGENCE COMMUNITY (IC)**

The first World Trade Center bombing in 1993 “signaled the rise of a new kind of terrorism, not sponsored by any state, not directed toward any particular political end, but intended just to kill as many Americans as possible.”<sup>142</sup> The attacks on 9/11 made counter-terrorism and the protection of our nation the number one issue for our government. The IC shouldered much of the blame for the failure to predict and prevent the 9/11 attacks. The Bush administration and Congress were determined to overhaul the numerous stove-piped intelligence organizations in America.

The first major step toward reform occurred when Congress passed the Intelligence Reform and Terrorism Prevention Act (IRTPA) of 2004. The IRTPA created the National Counterterrorism Center (NCTC) where law enforcement and intelligence personnel work side by side in the same headquarters. The IRTPA also created the Office of the Director of National Intelligence (ODNI). The Director of National Intelligence (DNI) serves as the head of the IC to ensure close coordination and integration of the 16 main governmental intelligence agencies and other intelligence components responsible for “foreign, military and domestic intelligence in defense of the homeland and of United States interests abroad.”<sup>143</sup> The DNI also acts as the “principal advisor to the President, the National Security Council, and the Homeland Security Council for intelligence.”<sup>144</sup> The ODNI published the first ever National Intelligence Strategy in 2005 that set into motion a mindset shift in the IC from the traditional principle of “need to know” and stove piped secrecy to a “need to share.”<sup>145</sup>

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<sup>142</sup> Jennifer Sims, *Transforming U.S. Intelligence*, (Washington D.C.: Georgetown University Press, 2005), 5.

<sup>143</sup> Office of the Director of National Intelligence (ODNI), <http://www.odni.gov/index.html> (accessed 29 August 2008).

<sup>144</sup> *Ibid.*

<sup>145</sup> The National Intelligence Strategy of the United States of America, October 2005 <https://www.hsd1.org/homesecc/docs/whitehouse/nps11-102705-01.pdf&code=3ab2debeac7ae3f6a856f7f6c19ae0f4> (accessed 29 August 2008), 14.

In April 2007, Mike McConnell, the DNI, announced a 100 Day Plan for Integration and Collaboration. The plan laid out “specific, measurable short-term goals” and created the “momentum to transform into a truly integrated community” that can use “all available national resources in a single, coordinated fashion.”<sup>146</sup> The plan identified six key areas for focus and improvement: 1.) Create a culture of collaboration 2.) Foster collection and analytic transformation 3.) Build technology leadership and acquisition excellence 4.) Modernize business practices 5.) Accelerate information sharing and finally, 6.) Clarify and align the DNI’s authority and leadership roles and responsibilities.<sup>147</sup>

In September of 2007, the DNI released an updated report on the progress of the “100 Day Plan.”<sup>148</sup> Successes included the implementation of a civilian joint duty program similar to the DoD’s Goldwater-Nichols Defense Reorganization Act of 1986. Equal employment opportunity and diversity have been improved in the IC in an effort to “recruit, hire and retain first-and second-generation Americans with critically needed language skills and unique cultural backgrounds.”<sup>149</sup> The security clearance process and information sharing have been improved by “standardizing identity and access policies across agencies, networks, and systems.”<sup>150</sup> Finally, the DNI instituted an IC-wide leadership forum and executive committee to help “resolve issues quickly and effectively with the heads of other U.S. intelligence agencies.”<sup>151</sup>

The ODNI has made significant improvements in the IC but there is still a lot to do so they now have a “500 Day Plan” to continue the efforts to help break down the stove pipes and build on their integration and collaboration successes.

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<sup>146</sup> Mike McConnell, DNI “DNI Announces 100 Day Plan for Integration and Collaboration,” [http://www.odni.gov/press\\_releases/20070411\\_release.pdf](http://www.odni.gov/press_releases/20070411_release.pdf) (accessed 29 August 2008).

<sup>147</sup> McConnell.

<sup>148</sup> Mike McConnell, DNI “Follow-up report on the status of the 100 Day Plan,” [http://www.odni.gov/press\\_releases/20070913\\_release.pdf](http://www.odni.gov/press_releases/20070913_release.pdf) (accessed 29 August 2008).

<sup>149</sup> Ibid.

<sup>150</sup> Ibid.

<sup>151</sup> Ibid.

### C. IMPROVEMENTS IN AIRLINE SECURITY

A 2004 RAND study concluded that the most likely terrorist attacks will be bombing “soft targets.”<sup>152</sup> Meanwhile, the federal government has taken drastic and costly steps to “harden” the civilian airline industry and improve security in an effort to minimize the chance of another hijacking in America.

The Department of Homeland Security (DHS) and Transportation Security Administration (TSA) were both formed after 9/11 in the largest reorganization of the federal government since the creation of the Defense Department in 1947. TSA has the critical responsibility for protecting the nation’s transportation system.<sup>153</sup> The agency was established in November 2001 with the passage of the Aviation and Transportation Security Act. TSA employs a workforce of approximately 50,000, including passenger and baggage screeners.<sup>154</sup> Their security officers operate at over 450 airports, 700 security checkpoints, and nearly 7,000 baggage screening areas.<sup>155</sup> The standardized checkpoints in the airports are the most visible action taken since 9/11 but they are only one measure in the many layers of defense designed to deter and prevent a terrorist from hijacking an airliner.

Other critical layers of the defense addressed in this chapter include the Federal Air Marshal Service (FAMS), reinforced cockpit doors, armed pilots (the Federal Flight Deck Officer (FFDO) program), the Alien Flight Student Program (AFSP), more stringent visitor and student visa requirements (U.S. VISIT), passenger watch lists including the international screening under the Advance Passenger Information System (APIS) as well as domestic screening with the “Secure Flight” program. The final, and probably most effective layer of defense is a more aware and less tolerant flying public.

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<sup>152</sup> Donald Stevens et al, *Near Term Options for Improving Security at Los Angeles International Airport*, Santa Monica, CA: Rand Corporation, 2004.

<sup>153</sup> Bruce Maxwell, *Homeland Security A Documentary History* (Washington, D.C.: CQ Press, 2004), xxii.

<sup>154</sup> Report on Transportation Security, Post –September 11<sup>th</sup> Initiatives and Long-Term Challenges. Washington DC: Government Accounting Office, 31 March 2003.

<sup>155</sup> TSA.



## **1. Federal Air Marshal Service (FAMS)**

The Federal Air Marshal Service (FAMS) had 33 agents on 9/11.<sup>156</sup> There are now approximately 6,000 full-time agents (the exact numbers are classified) while the federal government plans to spend \$663 million on the program in 2009.<sup>157</sup> The air marshals are placed on aircraft to “detect, deter, and defeat hostile acts targeting U.S. air carriers, airports, passengers, and crews.”<sup>158</sup> According to TSA, air marshals fly on at about 5% the 28,000 daily commercial flights in America.<sup>159</sup> Air marshals are highly trained in close quarter firearms employment and hand-to-hand combat. The FAMS agents pass on their training and knowledge to other federal, state, and local law enforcement officers who want to carry an accessible weapon on flights in America. They also train airline employees under the Crew Member Self-Defense and Federal Flight Deck Officer training programs.<sup>160</sup>

## **2. Federal Flight Deck Officer (FFDO) and Hardened Cockpit Doors**

Many airline pilots are now armed under the Federal Flight Deck Officer program.<sup>161</sup> This program allows pilots and flight engineers to carry and “use firearms to defend against an act of criminal violence or air piracy attempting to gain control of an aircraft.”<sup>162</sup> The FFDOs are trained by FAMS agents on the use of force, firearms, defensive tactics, and the legal issues associated with the program.<sup>163</sup> Also, the FAA and the International Civil Aviation Organization (ICAO) now require reinforced cockpit

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<sup>156</sup> Samantha Levine, “The Marshals’ Cloudy Skies,” *U.S. News*, (August 29, 2008).

<sup>157</sup> *Ibid.*

<sup>158</sup> Levine.

<sup>159</sup> Drew Griffin, “Sources: Air marshals missing from almost all flights,” <http://www.cnn.com/2008/TRAVEL/03/25/siu.air.marshals/index.html?iref=mpstoryview> (accessed 29 August 2008).

<sup>160</sup> TSA, “Law Enforcement, Office of Training and Development,” [http://www.tsa.gov/lawenforcement/training/fams\\_training.shtm](http://www.tsa.gov/lawenforcement/training/fams_training.shtm) (accessed 29 August 2008).

<sup>161</sup> Paul Weyrich, “Arming Airline Pilots,” *Newsmax*, 12 May 2005, [archive.newsmax.com/archives/articles/2005/5/11/171108.shtml](http://archive.newsmax.com/archives/articles/2005/5/11/171108.shtml) (accessed 9 September 2008).

<sup>162</sup> TSA, “Federal Flight Deck Officers,” <http://www.tsa.gov/lawenforcement/programs/ffdo.shtm> (accessed 30 August 2008).

<sup>163</sup> TSA.

doors on any airplane in the world with more than twenty seats. The doors are designed and built to “protect cockpits from forced intrusion, small-arms fire, and fragmentation devices (grenades).”<sup>164</sup> The FAA is evaluating the installation of video monitoring systems in the back of airliners so pilots can see what is going on in the cabin as well as installing aircraft transponders that operate continuously.<sup>165</sup>

### **3. Alien Flight Student Program (AFSP)**

Almost 8,000 foreign students receive flight training in the U.S. every year.<sup>166</sup> All the terrorist pilots that participated in the 9/11 attacks, including the “ringleader,” Mohamed Atta received their flight training in the U.S. without background checks, and possessed improper student visas.<sup>167</sup> The Vision 100 – Century of Aviation Reauthorization Act, 2003 mandated that DHS screen and track all foreign flight students in the U.S. under the Alien Flight Student Program (AFSP).<sup>168</sup> The goal of the program is to ensure foreign flight students in the America do not present a threat to the aviation community or national security. The TSA run program has an operating budget of almost \$12 million per year.<sup>169</sup> Applications for international students are easily accessed electronically on the AFSP webpage. AFSP requires all foreign flight students submit personal background information, photos, fingerprints, and a \$130 application fee to TSA for review and adjudication prior to beginning initial flight training at any of the 393 Federal Aviation Administration (FAA) certified flight schools.<sup>170</sup>

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<sup>164</sup> FAA, “Fact Sheet, Aircraft Security Accomplishment Since Sept. 11 (September 2002).” [http://www.faa.gov/newsroom/factsheets/2002/factsheets\\_020905.htm](http://www.faa.gov/newsroom/factsheets/2002/factsheets_020905.htm) (accessed 29 August 2008).

<sup>165</sup> Ibid.

<sup>166</sup> Brian Ross, Vic Walter and Eric Longabardi, “9/11 Redux: ‘Thousands of Aliens’ in U.S. flight Schools Illegally,” *ABC NEWS*, (27 February 2008) <http://abcnews.go.com/Blotter/story?id=4353991&page=1> (accessed 2 March 2008).

<sup>167</sup> “9/11 and Terrorist Travel,” A staff Report of the National Commission on Terrorist Attacks Upon the United States (Franklin, Tennessee: Hillsboro Press, 2004), 8.

<sup>168</sup> TSA, “Alien Flight Student Program,” *TSA, Department of Homeland Security*, [https://www.flightschoolcandidates.gov/afsp2/afspindex.py?acct\\_type=c&section=LI](https://www.flightschoolcandidates.gov/afsp2/afspindex.py?acct_type=c&section=LI) (accessed 2 March 2008).

<sup>169</sup> Ibid.

<sup>170</sup> TSA, AFSP.

The flight schools are required collect, verify, and maintain 12 different forms of identification and documentation once the student arrives for training including copies of the student's passport and visa.<sup>171</sup> The schools must also send a current photograph of the student, along with fingerprints, to TSA to verify that the individual showing up for training is in fact the same person who initially applied for the AFSP. Flight schools are also required to notify authorities if the students do not show up for training.<sup>172</sup> TSA and FAA inspectors visit flight schools periodically to ensure they are in compliance of the new security measures. An example of the effectiveness of this programmed occurred in August 2006 when the FBI launched a successful nationwide manhunt to track down several Egyptian flight students who failed to show up for flight training after entering the country.<sup>173</sup>

#### **4. Visa Screening and U.S.-VISIT Tracking Programs**

Prior to 9/11 there were serious problems with the way U.S. visitor and student visas were issued by the Department of State while the Immigration and Naturalization Service (INS) did not have an ability to effectively track a visitor's entry and exit. Nineteen of the September 11<sup>th</sup> hijackers applied for 23 visas and obtained 22.<sup>174</sup> Most of the visas were obtained with new passports to mask the applicants travel history and all applications were incomplete or fraudulent.<sup>175</sup> Only two of the 19 applicants were personally interviewed by a U.S. Department of State consular officer before being issued a visa.<sup>176</sup> At least six of the 9/11 hijackers overstayed their visas in violation of U.S.

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<sup>171</sup> TSA, AFSP.

<sup>172</sup> TSA, AFSP.

<sup>173</sup> Shane Harris, "Five Years After 9/11, Question is: Could It Happen Again?" *Government Executive*, 1 September 2006, [www.governmentexecutive.com/story\\_page.cfm?articleid=34922&ref=rellink](http://www.governmentexecutive.com/story_page.cfm?articleid=34922&ref=rellink) (accessed 4 September 2008).

<sup>174</sup> "9/11 and Terrorist Travel," A staff Report of the National Commission on Terrorist Attacks Upon the United States (Franklin, Tennessee: Hillsboro Press, 2004), 2.

<sup>175</sup> Ibid., 2.

<sup>176</sup> 9/11 Commission Report, 2.

immigration law.<sup>177</sup> Mohamed Atta, the ringleader of the attack, persuaded an INS inspector to let him reentered the U.S. in January 2001 to continue his flight training without a student visa.<sup>178</sup> Atta had overstayed his tourist visa on a previous visit to America, but there was no effective national tracking system in place at the time to match his previous immigration law violation.<sup>179</sup> The Department of State and DHS have improved the visa screening and visitor tracking process since 9/11.

The Enhanced Border Security and Visa Entry Reform Act of 2002 directed the Department of State to implement new, more stringent visa application procedures. Two of the most important mandates were machine-readable, tamper resistant entry and exit documents that use biometric identifiers as well as additional training for U.S. embassy consular officers to help spot applicants that may pose a threat. The Visa Screening Officers (VSO) program was created to improve the visa issuing process.<sup>180</sup> VSOs are deployed to embassies around the world, and given additional training in languages, fraud detection, and interview techniques.<sup>181</sup>

DHS has also undertaken a multi-billion dollar effort to screen and track the entry and exit of every visitor to the U.S. under the U.S.-VISIT program.<sup>182</sup> The program interfaces with over twenty existing systems and has uses the motto: “Keeping America’s Doors Open and Our Nation Secure.”<sup>183</sup> U.S.-VISIT is part of the layered security plan that starts overseas where visa applicants provide biometrics (digital finger print scans and photographs) to the U.S. consular offices issuing the visas. Applicants are checked

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<sup>177</sup> AP, Washington, *Hijackers carried fake visas*, 27 January 2004, <http://www.guardian.co.uk/world/2004/jan/27/september11.usa> (accessed 3 September 2008).

<sup>178</sup> Harris.

<sup>179</sup> Phil Hirschhorn, “9/11 panel describes how attackers got money,” *cnn.com/politics*, <http://www.cnn.com/2004/ALLPOLITICS/08/22/911.commission/index.html> (accessed 4 September 2008).

<sup>180</sup> Voice of America, “US Officials Outline Deficiencies in Visa Screening Process,” <http://www.voanews.com/english/archive/2004-09/a-2004-09-09-36-1.cfm> (accessed 8 September 2008).

<sup>181</sup> Ibid.

<sup>182</sup> Dave Kovaleski, “US-Visit: What Does it Mean For You?” *MEETINGSNET*, 15 March 2004, [http://meetingsnet.com/news/meetings\\_usvist\\_mean/](http://meetingsnet.com/news/meetings_usvist_mean/) (accessed 26 May 2008).

<sup>183</sup> Kovaleski.

against a database of suspected terrorists and known criminals.<sup>184</sup> The visitor's biometrics are then verified at the port of entry to ensure the person trying to enter the U.S. is in fact the same person who was issued the visa.<sup>185</sup> The U.S.-VISIT biometric entry system is now in place at 116 airports, 15 seaports and 154 land ports of entry in the United States.<sup>186</sup>

Airlines will be required to start collecting the biometric data of foreign visitors leaving the country when they check-in for their departure flight at the airport.<sup>187</sup> The airlines will pass this information on to DHS. Visitors who fail to depart the country on time will have their visas automatically voided and authorities at immigration enforcement will be notified. DHS plans to have the program up and running by the end of 2008 in an effort to crack down on visa overstays in compliance with the USA PATRIOT Act of 2001 and the Enhanced Border Security Act of 2002.<sup>188</sup>

## **5. Passenger Watch Lists**

On August 9, 2007, DHS announced that it was taking over the responsibility from the airlines for checking domestic and international passenger information against government watch lists.<sup>189</sup> "Previous attempts by the DHS to take over this function from airlines have failed amid objections from privacy advocates" but the lack of procedural consistency on the part of the carriers has forced DHS to finally act.<sup>190</sup> TSA receives passenger manifest information as early as 72 hours but no later than 30 minutes before a scheduled departure. They will notify the airlines and local security if any of the passengers are known or suspected terrorists in an effort to prevent them from boarding

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<sup>184</sup> Kovalski.

<sup>185</sup> Ibid.

<sup>186</sup> DHS, "US-VISIT Program," [http://www.dhs.gov/xtrvlsec/programs/content\\_multi\\_image\\_0006.shtm](http://www.dhs.gov/xtrvlsec/programs/content_multi_image_0006.shtm) (accessed 4 September 2008).

<sup>187</sup> Jason Miller, "DHS to Issue Plan for US-VIST Exit Program," *Government Information Group*, 18 October 2007, <http://www.fcw.com/online/news/150554-1.html#> (accessed 4 September 2008).

<sup>188</sup> Ibid.

<sup>189</sup> CNN, "DHS Taking Over Checking Passenger Info Against Watch Lists," <http://www.cnn.com/2007/US/08/09/dhs.security/index.html> (accessed 8 September 2008).

<sup>190</sup> CNN.

an aircraft.<sup>191</sup> TSA may also identify individuals for enhanced screening.<sup>192</sup> This program will “strengthen aviation security through uniformed and consistent passenger pre-screening and facilitate legitimate passenger air travel.”<sup>193</sup>

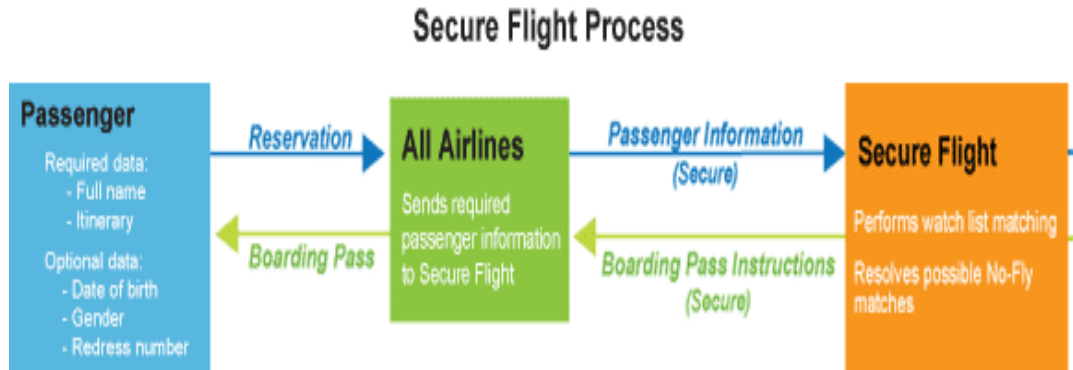


Figure 13. Secure Flight Process<sup>194</sup>

## 6. Public Awareness

Finally, “passengers would never allow four or five lightly armed hijackers to take over an airplane...not after 9/11....they would beat them to within an inch of their lives”.<sup>195</sup> One of the reasons for the losses we suffered on 9/11 was the hesitation of the crew and passengers on the hijacked flights to confront the hijackers because “most previous hijackings ended peacefully or with minimal loss of life.”<sup>196</sup> Crews were trained in the concept of passive resistance because no one had been killed during a hijacking in

<sup>191</sup> TSA, “Secure Flight Program,” [http://www.tsa.gov/what\\_we\\_do/layers/secureflight/index.shtm](http://www.tsa.gov/what_we_do/layers/secureflight/index.shtm) (accessed 8 September 2008).

<sup>192</sup> Ibid.

<sup>193</sup> Ibid.

<sup>194</sup> TSA, “Secure Flight Program,” [http://www.tsa.gov/what\\_we\\_do/layers/secureflight/index.shtm](http://www.tsa.gov/what_we_do/layers/secureflight/index.shtm) (accessed 2 September 2008).

<sup>195</sup> Shane Harris, “Five Years After 9/11, Question is: Could It Happen Again?” *Government Executive*, 1 September 2006, [www.governmentexecutive.com/story\\_page.cfm?articleid=34922&ref=rellink](http://www.governmentexecutive.com/story_page.cfm?articleid=34922&ref=rellink) (accessed 4 November 2007).

<sup>196</sup> Mark G. Stewart, “A Risk and Cost-Benefit Assessment of United States Aviation Security Measures,” <http://cryptome.org/avsec-assess.pdf> (accessed 8 September 2008), 7.

the U.S. prior to 2001.<sup>197</sup> The passengers of United Airlines flight 93 demonstrated the ferocity and determination of an aware American flying public when they stormed the hijackers in an attempt to regain control of the aircraft before it crashed near Shanksville, Pennsylvania. Richard Reid, the notorious shoe bomber was restrained by passengers on an international flight in late 2001 after he tried to detonate explosives in his shoes. It is almost certain that passengers today would follow the example of Flight 93 and resist any attempt to take over an airliner. “Indeed, passengers are probably the best line of defense currently available in civil aviation.”<sup>198</sup> For this reason alone, the likelihood that a terrorist organization would calculate that it could successfully hijack a commercial jet and employ it as a weapon has declined to the point where it is probably unrealistic for them to consider airliners “soft targets.”

#### **D. IMPROVEMENTS IN GENERAL AVIATION SECURITY**

There was a lot of concern immediately after 9/11 that terrorists may use small aircraft to attack targets in America so the federal government also made improvements to general aviation (GA) security in addition to improving the safety of commercial airlines. Small aircraft do not pose the kind of threat represented by large commercial jets are not subject to the same kinds of safeguards that surround airliners.

General aviation includes more than 550,000 pilots who fly 200,000 privately owned aircraft out of over 19,000 airports in America.<sup>199</sup> More than 5,400 communities rely solely on GA for their air transportation requirements.<sup>200</sup> General aviation contributes more than \$65 billion to our economy each year.<sup>201</sup> These aircraft transport

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<sup>197</sup> Stewart, 11.

<sup>198</sup> Harris.

<sup>199</sup> U.S. General Accounting Office (GAO), *Aviation Security, Efforts to Measure Effectiveness and Address Challenges*, GAO-03-843 (Washington, D.C.: 30 June 2003), 26.

<sup>200</sup> “Report to Congress: Improving General Aviation,” December 2001, <http://www.nonoise.org/library/generalav/> (accessed 15 September 2008).

<sup>201</sup> Ibid.

“critical-care medical patients, donor organs, blood supplies, overnight cargo, financial documents as well as providing security for electric transmission lines and petroleum/gas pipelines.”<sup>202</sup>

TSA formed a General Aviation Security Advisory Committee in 2003. The committee was made up of industry stakeholders such as the 398,000-member Aircraft Owners and Pilots Association (AOPA) and General Aviation Manufacturers Association. They were tasked with the responsibility for “recommending actions to close potential security gaps in general aviation.”<sup>203</sup> These organizations have agreed to a series of voluntary “best practices” security measures and made recommendations for additional improvements designed to enhance security.”<sup>204</sup> Some of the recommendations include:

- Additional airspace restrictions around critical infrastructure and at various locations throughout the country when intelligence indicates a heightened security threat.
- New difficult-to-counterfeit pilot certificates that include a photograph of the pilot.
- A government review of existing and new pilot certificates to ensure none of the pilots are on the terrorist watch lists.
- Thorough identity checks on people renting or purchasing aircraft.
- Increased airport security including additional fencing, entry control points, surveillance systems, local police presence, and additional vigilance along with security awareness training for ground crews and pilots.
- Aircraft owners and operators have taken additional steps to prevent the theft of their valuable planes. These measures have been effective because there have been “no terrorist attacks anywhere in the world using a general aviation aircraft” and the number of GA aircraft stolen in America was down by over 50% from 13 in 2002 to only six aircraft in 2003.<sup>205</sup>

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<sup>202</sup> Aircraft Owners and Pilots Association (AOPA), “AOPA and Other General Aviation Organization Offer Action Plan For enhancing GA Security,” <http://www.aopa.org/whatsnew/newsitems/2001/01-4-212.html> (accessed 14 September 2008).

<sup>203</sup> AOPA.

<sup>204</sup> U.S. General Accounting Office, *Aviation Security, Progress Since September 11, 2001 and the Challenges Ahead*, GAO-03-1150T (Washington, D.C.: 9 September 2003), 17.

<sup>205</sup> Aircraft Owners and Pilots Association, “General Aviation and Homeland Security,” [http://www.aopa.org/whatsnew/newsitems/2002/020621\\_homeland\\_security.html](http://www.aopa.org/whatsnew/newsitems/2002/020621_homeland_security.html) (accessed 14 September 2008).



The GA industry associations oppose more severe restrictions because they do not believe that small planes pose a significant risk to the country. Former TSA administrator Adm. James M. Loy told a congressional hearing that “in the emotional wake of the 9/11 attacks, some security officials may have overstated the threat from general aviation.”<sup>206</sup>

Over 70% of GA aircraft are single-engine machines with six or fewer seats. A typical four seat Cessna 172 “weighs less than a Honda Civic and carries even less cargo” compared to “Boeing 767 that can weigh more than 400,000 pounds and carry some 25,000 gallons of fuel.”<sup>207</sup>

The January 2002 suicide crash of a Cessna into an office building resulted in limited damage and no collateral deaths or injuries (see Figure 14). General aviation industry associations believe that this incident “demonstrates the ineffectiveness of a GA aircraft as a terrorist weapon.”<sup>208</sup>

Nuclear safety and security expert Robert M. Jefferson concluded that even an explosive-laden GA aircraft would not likely cause the release of radiation if it hit a nuclear power plant.<sup>209</sup> As a test, a remote controlled, 45,000 pound F-4 Phantom jet was “flown at 450 miles per hour into a concrete wall simulating a nuclear containment vessel resulting in the aircraft being destroyed while the concrete wall was uncompromised.”<sup>210</sup> According to AOPA, an F-4 is 18 times heavier than a Cessna 172 and even in a dive, a Cessna 172 cannot go much faster than 200 mph.<sup>211</sup>

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<sup>206</sup> AOPA.

<sup>207</sup> Ibid.

<sup>208</sup> Ibid.

<sup>209</sup> Aircraft Owners and Pilots Association, “AOPA-commissioned report concludes general aviation not a threat to nuclear power plants,” <http://www.aopa.org/whatsnew/newsitems/2002/02-2-160.html> (accessed 14 September 2008).

<sup>210</sup> Ibid.

<sup>211</sup> Ibid.



Figure 14. Cessna hit a building in Tampa, FL. Flown by a suicidal teenager.<sup>212</sup>

Congress has acknowledged the unique security challenges that general aviation faces and recommends a risk-based assessment of the threats and vulnerabilities for GA airports around the country.<sup>213</sup> This congressional support will allow airports to tailor security upgrades to their individual needs and access to much needed federal security grants.<sup>214</sup>

#### **E. RISK ASSESSMENT: HOW LIKELY IS ANOTHER 9/11 HIJACKING?**

Risk in homeland security “can be described by three fundamental factors: threat, vulnerability, and consequence.”<sup>215</sup> These factors impact America’s airline industry and risk of a terrorist hijacking.

##### **1. Threat**

There is no single, universally accepted, definition of terrorism. Terrorism is defined in the Code of Federal Regulation as “the unlawful use of force and violence

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<sup>212</sup> Tamara Lush, “Plane Hits Skyscraper,” *St Petersburg Times*, 6 January 2002.

<sup>213</sup> “Wasted Lessons of 9/11: How the Bus Administration Has Ignored the Law and Squandered Its Opportunities to make our Country Safer,” September 2008, <http://homeland.house.gov/SiteDocuments/HR1AnniversaryReport.pdf> (accessed 15 September 2008).

<sup>214</sup> Ibid.

<sup>215</sup> Matthew M. Allen, “Reducing the Risk,” *Homeland Security Affairs*, <http://www.hsaj.org/?essays:fullarticle=essays.1.1> (accessed 9 September 2008).

against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives” (28 C.F.R. Section 0.85).

There is a lot of debate over the issue of the Global War on Terror (GWOT) and the threat to our homeland. Many of the official intelligence estimates are classified and the unclassified intelligence estimates and official statements are very vague about specific threats. DHS notes, “there is not credible, specific intelligence suggesting an imminent threat to the homeland at this time” and their Homeland Security Threat Assessment for 2008-2013 makes no mention of threats to aviation at all, yet the debate rages over whether we are doing too much or not enough to protect America.<sup>216</sup>

There were 3,178 terrorism-related deaths in the U.S. between 1980 and 2005.<sup>217</sup> Approximately 98% of the deaths resulted from just two incidents, Oklahoma City Federal building bombing in 1995 and 9/11. Despite the undoubted tragedy of these incidents, their equally obvious rarity has raised the question, in the minds of some observers, whether we are “Trapped in a War on Terror” as Ian S. Lustick claims in his book. Lustick says that the government is “...stoking the public fears and attracting vast political and economic resources in response to them, the War on Terror encourages, indeed virtually compels, every interest group in the country to advance its own agendas as crucial for winning the war.”<sup>218</sup> “The magnitude of securing the homeland can be brought home simply by looking at the millions of potential terrorist targets in the U.S.”<sup>219</sup> Lustick believes the effort to “master the unlimited catastrophes” is diverting

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<sup>216</sup> Department of Homeland Security, “Homeland Security Advisory System,” 24 October 2008 [http://www.dhs.gov/xinfo/share/programs/Copy\\_of\\_press\\_release\\_0046.shtm](http://www.dhs.gov/xinfo/share/programs/Copy_of_press_release_0046.shtm) (accessed 25 October 2008).

<sup>217</sup> “Terrorism 2002-2005,” *U.S. Department of Justice, Federal Bureau of Investigation*, [http://www.fbi.gov/publications/terror/terrorism2002\\_2005.pdf](http://www.fbi.gov/publications/terror/terrorism2002_2005.pdf) (accessed 31 November 2007).

<sup>218</sup> Ian S. Lustick, *Trapped in the War on Terror*, (Philadelphia, PA: University of Pennsylvania Press, 2006), ix.

<sup>219</sup> Glen Hastedt, *American Foreign Policy, Past, Present, Future* (Upper Saddle River, NJ: Pearson Education, 2008), 47.

and distorting the military.<sup>220</sup> The GWOT is costing the U.S. taxpayers as much as \$2 trillion yet the odds of being killed by lightning are almost twice as great as being attacked by a terrorist in America.<sup>221</sup>

The 2007 National Intelligence Estimate (NIE) states, “the U.S. Homeland will face a persistent and evolving terrorist threat over the next three years”... primarily from Islamic terrorist groups.<sup>222</sup> There is no question that our adversaries hope that this is true. Al-Qa’ida masterminded the 9/11 attacks and has expressed its determination to strike again. Terrorists certainly have both the intent and capability to attack America and want the biggest bang for their buck without exposing their plan ahead of time. Attacking the airline industry again will have an effect on our critical transportation infrastructure and get the terrorist the international publicity they desire. But, there are literally thousands of critical infrastructure targets around the country that they could strike that are less “hardened” and would net a similar result (i.e., power, water, food, communications, rail, shipping, etc). The U.S. annual intelligence community budget is over \$44 billion, with most of the money and effort being focused on evaluating the terrorist threat and trying to determine where they will strike next.<sup>223</sup> It is of course a mistake to assume that the scale of efforts to anticipate and avert another attack is a measure of the likelihood that such an attack will or can occur. It is, however, a measure of the anxiety that the terrorist threat has inspired among policy makers; and there is little reason to expect it to subside anytime soon.

## **2. Vulnerability**

A target’s vulnerability “depends on such factors as target hardness or single point failures, as well as redundancy and reconstitution capability.”<sup>224</sup> Increased security measures in the airline industry can act as a deterrent to reduce vulnerability and risk. A

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<sup>220</sup> Hastedt, 47.

<sup>221</sup> Charles Ferguson, *No End in Sight, The American Occupation of Iraq* (Magnolia Pictures, Documentary, 2007).

<sup>222</sup> Hastedt, 39.

<sup>223</sup> Scott Shane, “Budget for U.S. Intelligence,” *The New York Times*, 8 November 2005.

<sup>224</sup> Allen.

2005 study of hijackings between 1946 and 1985 showed that prospective hijacker's are not likely to proceed if they think they will fail.<sup>225</sup> Success is defined when hijackers gain control of the plane and reach their destination.<sup>226</sup> The Figure below shows how successful hijackings decreased in the U.S. compared to the trends in rest of the world starting in early 1973. That year, metal detectors and law enforcement officers were added to the U.S. screening checkpoints (the outlier exceptions to the trend were 1975, 1980, and 1983).<sup>227</sup>

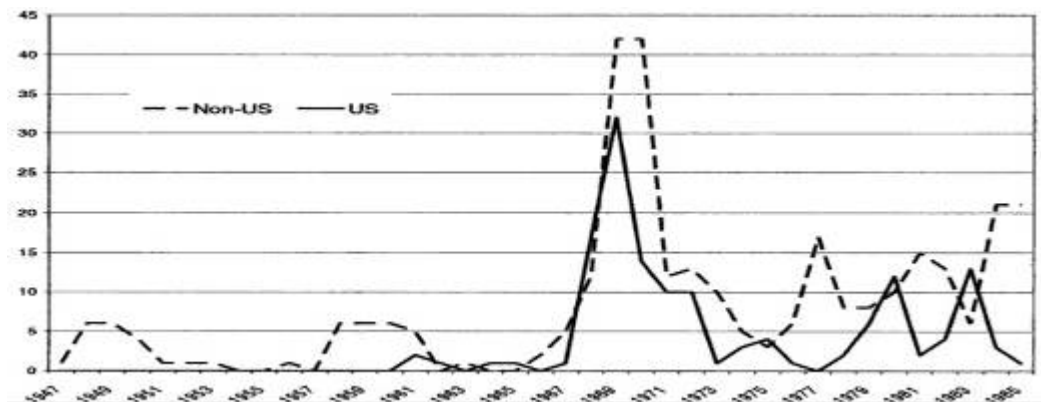


Figure 15. U.S. and Non-U.S. Successful Hijackings, 1946-1985<sup>228</sup>

Since 9/11, TSA has created the “20 Layers of Security” to reduce the airline industry’s vulnerability. The layers are designed to help deter and prevent future terrorist hijacking, provide defense in depth of our airline transportation industry, and protect the traveling public. Fourteen of the 20 security layers are considered “pre-boarding” measures while the six remaining measures are categorized as “in-flight” security improvements. The in-flight improvements can be grouped into three areas including crew and passenger resistance, hardened cockpit doors, and the Federal Air Marshal Service. This next section will offer an assessment of the security measures implemented to reduce risk and vulnerability.

<sup>225</sup> Paul Kantor et al, *Intelligence and Security Informatics*, (Atl, GA.: Springer Press, 2005), 352-358.

<sup>226</sup> Ibid.

<sup>227</sup> Kantor, 350.

<sup>228</sup> Kantor, 350.

Even though there have been “no successful hijacking anywhere in the world since 9/11,” this analysis will assume that the sum of all 14 “pre-boarding” TSA measures reduce the risk (R) of hijacking by an estimated 49%.<sup>229</sup> The three categories of “in-flight” efforts reduce the risk by another 50% (or 16.67% each) for a total of 99% risk reduction effectiveness.<sup>230</sup> One hundred percent risk reduction is unrealistic as there are inherent uncertainties in trying to quantify the effectiveness of security measures. Despite the fact that crew and passenger resistance is arguably, the most effective of all measures, for simplicity, it is assigned the same 16.67% value as the other three in-flight measures. Because Federal Air Marshal Service agents are only on about 5% of the flights in America, the program is considered less than 1% effective ( $16.67 \times .05 = 0.83\%$ ). The sum for the three in-flight security efforts is 34.17%.

Overall, TSA’s 20 pre-boarding and in-flight security measures, along with heightened passenger awareness, reduce our vulnerability to hijackings by approximately 83% when compared to pre-9/11 risk levels (see Table 1). The assumptions for this calculation and estimates for the effectiveness of TSA’s security measures may be overly optimistic as there are many uncertainties to consider when calculating risk, but at least this provides a starting point for future debate.

R (pre-boarding security) =	49.00%
R (crew and passenger resistance) =	16.67%
R (hardened cockpit doors) =	16.67%
R (Federal Air Marshal Service) =	<u>0.83%</u>
Total= 83.17% Effectiveness	

Table 1. Security Measures and Associated Vulnerability (Risk) Reduction<sup>231</sup>

### 3. Consequence

The consequence of a successful terrorist attack can be quantified by calculating the potential loss of life, property, and the indirect economic impact.<sup>232</sup> Quantifying

<sup>229</sup> Stewart, 10.

<sup>230</sup> Stewart, 9.

<sup>231</sup> Stewart, 10.

<sup>232</sup> Allen.

consequence allows us to rank order the risk of various types of attacks while allocating our finite risk mitigation resources. The immediate consequence of the 9/11 attacks were the loss of over 3000 lives and a direct cost of \$27.2 billion for physical assets, lost revenue, lost jobs, and the cleanup.<sup>233</sup> The long-term consequence for the airline industry has been an estimated \$40 billion in indirect losses in revenue as a result of the attacks and high fuel prices.<sup>234</sup> Whether similarly spectacular results can be achieved in the future is a matter of speculation. We no longer live in a world in which hijackers are assumed to be interested in ransom, and as a consequence their ability to gain and maintain control of an aircraft they have seized has been significantly reduced. Realistically, the most likely result of a terrorist hijacking is not likely to extend beyond the destruction of the aircraft and the death of everyone on board, an undoubted calamity by any standard, but not the sort of event that could be expected to alter the political or social fabric of our country.

## **F. CONCLUSION**

It is unrealistic to think that all security measures can be 100% effective and that terrorist attacks on the airline industry can be totally eliminated. Even the *National Security Strategy for Homeland Security* recognizes “that the future is uncertain and that we cannot envision or prepare for every potential threat, we must understand and accept a certain level of risk as a permanent condition.”<sup>235</sup>

But, what is an acceptable level of risk and when do we know that we have succeeded in winning the war on terror? According the Brookings Institution, winning the war will not mean “the complete elimination of any possible terrorist threat...but rather the reduction of the risk of terrorism to such a level that it does not significantly affect average citizens’ daily lives, preoccupy their thoughts, or provoke

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<sup>233</sup> Robert Looney, “Economic Cost to the United States Stemming From the 9/11 Attacks,” *Strategic Insights*, Volume 1, Issue 6 (August 2002).

<sup>234</sup> Makinen.

<sup>235</sup> Homeland Security, *National Strategy for Homeland Security* (Washington, DC: Government Printing Office, October 2007), 25.

overreaction.”<sup>236</sup> At a certain point, “even the terrorist will realize their violence is futile” once they accept that the economic losses as a result of their attacks will be short lived because of our resilient infrastructure, institutions, and economy.<sup>237</sup> It is difficult to say if we have reached that point in our efforts to secure the airline and general aviation industry but we have certainly come a long way in improving the confidence and safety of the flying public since September 2001.

Despite the risk mitigation improvements in aviation security there is no end in sight for Operation Noble Eagle. Brig. Gen David E. Clary, former Air Force homeland security director, noted in an interview that “we as a nation have come a long way, but have a long way to go.” “Success, however is hard to measure, there is not much instant gratification available when operating in a defensive posture.” General Clary continued by saying, “there have not been any successful attacks within the United States since 9/11, but have we negated the threat...at this point...who knows?”<sup>238</sup> Canadian Air Force Lt. Gen. Eric A. Findley, former deputy commander of NORAD believes “Noble Eagle is here for the long haul and is going to be an enduring mission,” continuing until *someone* can say the “threat” has been reduced, “and we can go back to something a little less rigorous.”<sup>239</sup>

The next chapter will address the financial cost of Noble Eagle and its impact on the Air Force’s combat capability.

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<sup>236</sup> Philip Gordon, “Can the War on Terror Be Won?” *Foreign Affairs* 86, no. 6 (November/December 2007), 54.

<sup>237</sup> Philip Gordon, “Can the War on Terror Be Won?” *Foreign Affairs* 86, no. 6 (November/December 2007), 54.

<sup>238</sup> Adam J. Hebert, “Homeland Air Force,” *Air Force Magazine*, January 2004, 39.

<sup>239</sup> Otto Kreisher, “The Years of Noble Eagle,” *Air Force Magazine*, June 2007, 52.



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## V. THE COST AND IMPACT OF OPERATION NOBLE EAGLE

### A. THE FINANCIAL COST OF OPERATION NOBLE EAGLE

By December 2007, Congress had approved over \$700 billion in direct appropriations for the Global War on Terror (GWOT).<sup>240</sup> According to Congressional testimony, the total cost of the war may end up over \$2.7 trillion.<sup>241</sup> Operation Noble Eagle has received \$28.7 billion in direct congressional supplemental funding (see Table below).<sup>242</sup> Much of the supplemental funding was used to pay for the Reserve and Guard forces called up to help support the operation as well as the combat air patrols that cost about \$1.3 billion per year.<sup>243</sup>

Operation	FY01 & 02	FY03	FY04	FY05	FY06	FY07	FY08	TOTAL
DoD	\$13.0B	\$8.0B	\$3.7B	\$2.1B	\$0.8B	\$0.5B	\$0.5	\$28.7B

Table 2. Congressional Budget for Operation Noble Eagle FY 2001-2008<sup>244</sup>

According to these figures from the Congressional Research Service (CRS), the monthly average for ONE supplemental funding dropped from \$520 million in FY2003 to around \$45 million in FY2007. The congressional funding declined for ONE as “one-time costs ended and other costs have been incorporated in day-to-day operations.”<sup>245</sup> Beginning in FY2005, DoD started funding Noble Eagle in its baseline operation and

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<sup>240</sup> Amy Belasco, CRS Report for Congress, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operations Since 9/11*, Washington D.C., Congressional Research Service, Library of Congress, RL33110, 8 February 2008, 2.

<sup>241</sup> David Goldman, “Iraq war could cost taxpayers \$2.7 trillion,” *CNNMoney.com*, 12 June 2008, [http://money.cnn.com/2008/06/11/news/economy/iraq\\_war\\_hearing/index.htm?cnn=yes](http://money.cnn.com/2008/06/11/news/economy/iraq_war_hearing/index.htm?cnn=yes) (accessed 26 October 2008).

<sup>242</sup> Belasco, 15.

<sup>243</sup> *Ibid.*, 19.

<sup>244</sup> *Ibid.*

<sup>245</sup> *Ibid.*, 22.

maintenance (O&M) budget rather than with congressional supplemental GWOT funding.<sup>246</sup> This accounting effort allowed congress to shrink their direct supplemental contributions to \$500 million in FY2007 for ONE.<sup>247</sup> The Air Force is now responsible for funding the bulk of NORAD's C3 structure (personnel and equipment), along with the ANG alert bases, and the National Special Security Event CAPs from their annual DoD budget. Therefore, the CRS claim of \$45 million a month is not an accurate figure for what Operation Noble Eagle is actually costing but rather just what congress is paying directly to supplement the mission. The \$45 million does not include the Air Force's total O&M cost. Estimates from the Air Force's accounting office have run as high as \$200 million a month, just to support CAPs for ONE.<sup>248</sup>

The actual cost for all the DoD personnel and ANG alert bases participating in ONE is difficult to estimate but there are some figures available for flying hour costs and facilities upgrades.

Over 184,000 flight hours have been flown in support of Operation Noble Eagle.<sup>249</sup> The average Air Force fighter cost \$19,400 per flight hour in 2007 and has increased at a rate of 9.8% per year since 2003.<sup>250</sup> An air refueling tanker costs \$14,300 per hour and an AWACS command and control aircraft costs an average of \$44,500 per hour to operate.<sup>251</sup> The price per flight hour includes mission personnel, unit level consumption, intermediate and depot maintenance, as well as contractor and sustainment support.<sup>252</sup>

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<sup>246</sup> Belasco, 19.

<sup>247</sup> Ibid.

<sup>248</sup> Hebert, 44.

<sup>249</sup> 1<sup>st</sup> Air Force, "AFNORTH Sortie Count" 1 June 2008, <http://www.1af.acc.af.mil/> (accessed 25 October 2008).

<sup>250</sup> Rodney J. McKinley, "Air Force Key Talking Points," Volume 3, Edition 9, *Office of the Chief Master Sergeant of the Air Force*, (September 2008).

<sup>251</sup> Ibid.

<sup>252</sup> Ibid.

NORAD has invested a significant amount of money in facilities and equipment upgrades since 9/11. They spent over \$700 million after 9/11 to upgrade the “attack warning systems within Cheyenne Mountain, CO.”<sup>253</sup> That cost does not include the corresponding upgrades to the C3 facilities at CONR, WADS, and EADS. Admiral Tim Keating, former Commander of USNORTHCOM/NORAD had his headquarters at Peterson AFB, CO. In 2006 he said “I can’t be in two places at one time” so he decided to put the newly renovated Cheyenne Mountain facility on “warm standby” after they determined a surprise missile attack by China or Russia was very unlikely.<sup>254</sup> NORAD started moving their operations to Peterson AFB (east of Colorado Springs) in May, 2008 at an initial cost of over \$47 million in order to “improve unity of effort and command” with USNORTHCOM headquarters.<sup>255</sup> U.S. Senator Wayne Allard from Colorado estimates NORAD’s move to Peterson AFB may end up costing over \$12 billion.<sup>256</sup>

## **B. NOBLE EAGLE’S IMPACT ON TRAINING AND COMBAT CAPABILITY**

This research did not uncover any official studies that linked Operation Noble Eagle to a reduction in training opportunities for fighter squadrons and the resulting reduction in combat capability, but there is a lot of anecdotal evidence as well as past experience with similar military operations. Interviews and email exchanges were conducted with personnel from five active duty and ANG operational fighter squadrons while researching this section.

### **1. Air Force Training and Proficiency Requirements for Fighter Pilots**

Headquarters Air Combat Command’s (ACC) Ready Aircrew Program (RAP) “is designed to codify the training-sortie rates needed for pilot proficiency and thereby create planning factors for sortie rates and the ability to justify flying hour budgets” for

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<sup>253</sup> Jerome R. Corsi, “NORAD’s New Home,” *World Net Daily*, 19 June 2007, [http://www.worldnetdaily.com/news/article.asp?ARTICLE\\_ID=56234](http://www.worldnetdaily.com/news/article.asp?ARTICLE_ID=56234) (accessed 25 October 2008).

<sup>254</sup> Bruce Finley, “Military to put Cheyenne Mountain on standby,” *denverpost.com*, December 26, 2006, [http://www.denverpost.com/nationworld/ci\\_4103478](http://www.denverpost.com/nationworld/ci_4103478) (accessed 29 October 2008).

<sup>255</sup> Ibid.

<sup>256</sup> Pam Zubeck, “Closing NORAD May Cost \$12B,” *The Colorado Springs Gazette*, 15 June 2007.

operational fighter squadrons.<sup>257</sup> The goal of the RAP program is to “develop and maintain a high state of mission readiness for immediate and effective employment across the range of military operations.”<sup>258</sup> Air Force Instructions mandate that squadrons use their flying hours to “achieve optimum training” and “maintain wartime readiness.”<sup>259</sup>

Each major weapon system in the ACC has its own specific RAP requirements based on their assigned mission. The RAP dictates the minimum number, frequency, and types of training sorties required for pilots to maintain their combat mission ready (CMR) status. A CMR pilot is considered to be qualified and proficient in all of the primary missions tasked to their assigned unit and weapons system.<sup>260</sup> A basic mission capable (BMC) pilot is familiar with all, and may be qualified and proficient in only *some* of the primary missions.<sup>261</sup> BMC pilots do not fly as often or deploy regularly with the operational squadrons because they normally attached to flying squadrons but actually work in wing supervision or staff functions on base.<sup>262</sup> Pilots who fail to meet the minimums will regress to non-CMR/BMC status. They will then be required to fly additional sorties and accomplish extra training to re-qualify for CMR/BMC status.

ORGANIZATION	Cycle	BMC Inexp/Experienced	CMR Inexp/Experienced
ACC	RAP Total	130/110	210/190
	3-Month Lookback	18/15	30/27
	1-Month Lookback	6/5	10/9

Table 3. ACC F-15C Ready Aircrew Program Mission Requirements (20-Month Cycle)<sup>263</sup>

<sup>257</sup> William H. Mott, Lt. Col, USAF, “F-15A versus F/A-22 Initial Operational Capability,” (Air War College, Maxwell Paper No. 36, November 2005).

<sup>258</sup> Air Force Instruction (AFI) 11-202, Volume 1, “Flying Operations, AIRCREW TRAINING,” 17 May 2007, 4 <http://www.e-publishing.af.mil/shared/media/epubs/AFI11-202V1.pdf> (accessed 25 October 2008).

<sup>259</sup> *Ibid.*, 17.

<sup>260</sup> *Ibid.*, 17.

<sup>261</sup> *Ibid.*, 8.

<sup>262</sup> *Ibid.*, 9.

<sup>263</sup> Air Force Instruction (AFI) 11-202, Volume 1, 12.

An inexperienced USAF fighter pilot is one with fewer than 500 flight hours in his/her weapons system. An inexperienced F-15 or F-16 pilot in ACC is required to fly a minimum of 10 RAP missions each month, 30 missions in 90 days, and 210 RAP missions during a 20-month cycle (see Table 3 above).<sup>264</sup> An experienced (more than 500 hours) pilot is required to fly nine RAP missions each month. Sitting alert and flying endless circles in the sky during air patrol in support of Operation Noble Eagle offers little training value for the fighter squadrons and pilots involved. According to Major General John Baker, former assistant deputy chief of staff for air and space operations, “a fighter pilot on a CAP mission gets to practice the tasks of managing his fuel and doing tanking (air refueling) procedures but not much else.”<sup>265</sup> Therefore, Operation Noble Eagle missions are considered non-demanding contingency missions and do not count as Ready Aircrew Program sorties for the pilots because of their limited training value.

## **2. Noble Eagle’s Impact on a Fighter Squadron’s Combat Capability**

The U.S. Air Force is slowly reducing the number of fighter squadrons in the continental United States (CONUS). For example, in 2001 there were seven active duty operational F-15C squadrons in the CONUS. Today, there are four and by October 2010, there will only be one active duty operational Eagle squadron in the CONUS. There are a lot fewer jets and pilots to support Noble Eagle but NORAD and CONR’s demand for support has not changed much in the last four year. The result has been more Operation Noble Eagle combat air patrols and fewer training sorties for the remaining pilots.

The Government Accounting Office (GAO) noted that “during Operation Noble Eagle, DoD provides enhanced combat air patrols which generally require only basic skills needed but offer little opportunity to practicing the varied combat skills needed for wartime proficiency.”<sup>266</sup> Therefore, “the critical skills necessary for combat proficiency

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<sup>264</sup> Air Force Instruction (AFI) 11-202, Volume 1, 12.

<sup>265</sup> John A. Tirpak, “Airpower for the Long Haul,” *Air Force Magazine*, March 2002, <http://www.airforce-magazine.com/MagazineArchive/Pages/2002/March%202002/0302airpower.aspx> (accessed 25 October 2008).

<sup>266</sup> General Accounting Office. Homeland Defense, DOD Needs to Assess the Structure of U.S Forces for Domestic Military Mission, GAO-03-670. Washington, DC: GAO (July 2003).

will atrophy without constant training and combat units are unable to maintain proficiency in combat flying skills when performing domestic Noble Eagle missions.”<sup>267</sup> A senior Air Force official said he “worries that when the Noble Eagle pilots come up for their turn on an overseas deployment, their skills won’t be up to our normal standards.”<sup>268</sup>

The Noble Eagle alert commitments and air patrols take jets, experienced flight leads, and instructors away from the squadrons causing an interruption of training for all the aircrew, but especially the junior pilots. Most active duty Air Force flying squadrons are manned at 100% but usually 60% or more of the assigned pilots are considered “inexperienced” with fewer than 500 flight hours. Active duty Air Force squadrons do not get additional flight hours from the Air Force (DoD) to support Noble Eagle so the ONE sorties and flying hours are subtracted from of the individual squadron’s annual training budget.<sup>269</sup>

Fewer flight hours for training adds additional stress on squadrons who are trying to maintain their pilot’s proficiency. Especially when “desperate to save money,” the USAF cut another 10% from its flying hour program in 2008.<sup>270</sup> An average pilot is assigned to a CONUS squadron for two to three years. Active duty USAF squadrons are constantly struggling to train and upgrade combat ready pilots during that two to three year period, yet, “not all aircrews are meeting their minimum training levels.”<sup>271</sup> Using valuable flying hours while orbiting in CAPs over the United States in support of ONE prevents pilots from preparing to fly and fight America’s future wars against advanced tactical and asymmetric threats.

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<sup>267</sup> GAO. DOD Needs to Assess the Structure of U.S Forces for Domestic Military Mission.

<sup>268</sup> Tirpak.

<sup>269</sup> ACC Fighter Squadron Commander, interview with author, 4 September 2008.

<sup>270</sup> Marc V. Schanz, “Scarce Flying Hours,” Air Force Magazine, January 2008, <http://www.afa.org/magazine/jan2008/0108scarce.html> (accessed 30 April 2008).

<sup>271</sup> Schanz.

Operation Noble Eagle missions and support deployments have a long-term cascading effect on the readiness of the squadrons tasked to participate. A typical fighter squadron schedules about 290 training sorties a month but actually flies around 260 flights (~312 flight hours) due to maintenance attrition and weather. A squadron flying Noble Eagle air patrols over a weekend averages 36 sorties and 234 flight hours at a cost of over \$4.5 million (~75%) of the squadron's monthly flying hour budget.<sup>272</sup> As a general rule of thumb, almost none of the squadron's pilots will make RAP during a month when the squadron supports more than three days of Noble Eagle CAP missions from home base.<sup>273</sup> A single deployment during a month also guarantees only a handful of the pilots will make RAP for at least one, and maybe up to three months depending on the duration and the number of jets taken on the deployment. According to one squadron commander, "Operation Noble Eagle is an ugly baby, I hate it."<sup>274</sup>

In August 2008, an active duty Air Combat Command squadron was ordered to take six of their 18 jets along with 10 of their 30 pilots to an off-site location to support Noble Eagle alert and CAP missions for two weeks.<sup>275</sup> The deployment's impact on the squadron lasted for months. The daily flight training at the home base was reduced by 60% during the squadron's deployment. None of the deployed pilots were able fly training missions. The pilots who stayed at home were only able to fly once or twice during the two week deployment. As a result, 40.9% of the pilots did not make their minimum ACC Ready Aircrew Program requirements for the month of August.<sup>276</sup> The squadron was still recovering from the deployment almost 90 days later (October 2008) when 31.8% of the squadron's pilots were still not able to meet the minimum CMR training requirement.<sup>277</sup> This was because the squadron simply did not have enough jets and sorties available to quickly make up for the lost two weeks of training in August.

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<sup>272</sup> ACC Fighter Squadron Commander, email message to author, 29 October 2008.

<sup>273</sup> Ibid.

<sup>274</sup> Ibid.

<sup>275</sup> ACC Fighter Squadron Operations Officer, e-mail message to the author, 3 October 2008.

<sup>276</sup> Ibid.

<sup>277</sup> Ibid.



Another active duty ACC squadron deployed four jets, pilots, and personnel to a location within the continental U.S. for four months to support an ONE alert commitment for an ANG squadron that had lost its certification in a readiness inspection.<sup>278</sup> No training sorties were flown at the deployed location, so all the pilots had to rotate back to home base every two weeks to maintain their basic flying currencies.<sup>279</sup>

The detrimental impact of deployments and long operations on fighter squadrons is not new for the Air Force. In 1999, it took the Air Force over 18 months to recover from the 78-day Balkans operation because of the “missed training, absence of instructors for new recruits (pilots), and missed rest and recuperation for the troops.”<sup>280</sup>

### **3. Noble Eagle’s Impact on Maintenance**

Alert commitments, deployed operations, and long flight hours in the CAPs not only impact the pilots but also require a huge effort from maintenance. Aircraft maintenance personnel have some of the highest deployment rates of any job specialty in the Air Force.<sup>281</sup> To support deployed operations, maintenance must send an average of 10-14 personnel per jet. These numbers including supervisors, and crew chiefs along with specialists for weapons, fuels, sheet metal, hydraulics, avionics, life support, etc. The deployments leave fewer maintainers at home to service the jets and support local flying.

A typical F-15C fighter squadron flies 18 training sorties each day. Two days of flying Noble Eagle missions from home base actually cost a squadron four days of flight training because maintenance removes the jets from the flying schedule in order to service them at least one day before the ONE mission begins.<sup>282</sup> Maintenance also loads live missiles, bullets, and extra fuel tanks during this downtime. Twenty-four hour CAPs from home base require maintenance and operations to adjust their work schedules

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<sup>278</sup> ACC Fighter Squadron Commander, interview with the author, 4 September 2008.

<sup>279</sup> Ibid.

<sup>280</sup> Tirpak.

<sup>281</sup> McKinley.

<sup>282</sup> ACC Fighter Squadron Commander, interview with the author, 4 September 2008.

to support both day and night missions. After the ONE missions are over, maintenance removes the jets from the flying schedule for another day to download the live weapons and reconfigure the aircraft for training at the cost of another day of training sorties.

Each jet goes into a periodic phase inspection about every 200 hours. The phase inspections can last anywhere from three days to two weeks. The additional long flight hours in the ONE CAPs accelerate the flow of the jets into phase maintenance causing a backlog. The backlog of phase jets increases the workload for the maintainers at home station and reduces the number of aircraft available for operational flight training.

The Air Force's fighter fleet has an average age of 20 years.<sup>283</sup> The service is keeping its "aging F-15s and F-16s flying beyond their anticipated retirement dates by sinking billions into additional service-life extension programs and upgrades."<sup>284</sup> The long hours in the CAPs are putting additional strain on the airframes, engines, and supply of spare parts. A clear indication of the age and stress on the fleet occurred in November, 2007 when an F-15C from the St. Louis, MO ANG broke in half in mid-air. The entire F-15 fleet was grounded worldwide for months to allow maintenance inspections and repairs on defective and fatigued metal beams in the aircraft's frames.<sup>285</sup> According to Major General Baker, Air Force logistics experts are "closely watching the hours being accumulated by F-15s and F-16s and without question, there will have to be a major infusion of more money for spare parts and additional maintenance" to sustain the fleet in the future.<sup>286</sup>

#### **4. Noble Eagle's Impact on the Air National Guard**

The Noble Eagle mission also adds to the Air National Guard's workload. Most of the 16 ANG squadrons that sit 24/7/365 alert are also expected to prepare for and

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<sup>283</sup> McKinley.

<sup>284</sup> Erik Holmes, "Officials say current plans create fighter gap," Air Force Times, (17 April 2008), [http://www.airforcetimes.com/news/2008/04/airforce\\_jsf\\_041508/](http://www.airforcetimes.com/news/2008/04/airforce_jsf_041508/) (accessed 29 October 2008).

<sup>285</sup> KMOV, St. Louis Area News, "Air National Guard officials discuss investigation of F15 crash," 10 January 2008, [http://www.kmov.com/localnews/stories/kmov\\_localnews\\_080110\\_plane crashresults.b88f6c4.html](http://www.kmov.com/localnews/stories/kmov_localnews_080110_plane crashresults.b88f6c4.html) (accessed 29 October 2008).

<sup>286</sup> Tirpak.

support Air Expeditionary Force (AEF) deployments to Iraq and Afghanistan. F-16 fighter squadrons like the 121st at Andrews AFB, MD have deployed overseas at least twice since 9/11.<sup>287</sup> The alert mission requires these squadrons to put a minimum of two pilots and three jets on alert at all times, along with maintenance and support personnel. That means those jets and pilots are not available for AEF spin-ups and take a “big bite out of local training” according to their squadron commander.<sup>288</sup>

The Air Guard is able to handle the demands of the alert missions and AEFs deployment better than the active duty by having fewer mandated BMC/CMR mission requirements for their pilots (see Figure below). They also rely heavily on the experience level of their maintainers and aircrew “who average twice the flight hours of pilots in most active duty Air Force fighter squadrons” but that experience level is dropping.<sup>289</sup> The high operations tempo and overseas deployments are starting to put a strain on the ANG’s recruiting and retention rates. Over 90,000 ANG personnel have deployed in support of the GWOT since 9/11.<sup>290</sup> Over 48% of pilots are turning down bonuses and leaving the Air Force after their initial pilot training commitment expires.<sup>291</sup> “Trying to keep guys in the service...has been a challenge” according to Lt Col David Miles, air sovereignty alert Commander for the 113<sup>th</sup> Wing at Andrew AFB.<sup>292</sup>

<b>ANG</b>	RAP Total	120/100	160/120
	3-Month Lookback	18/15	24/18
	1-Month Lookback	6/5	8/6

Table 4. ANG F-15C RAP Mission Requirements (20 Month Cycle)<sup>293</sup>

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<sup>287</sup> Tirpak.

<sup>288</sup> Ibid.

<sup>289</sup> Ibid.

<sup>290</sup> McKinley.

<sup>291</sup> Ibid.

<sup>292</sup> Tirpak.

<sup>293</sup> AFI 11-2F-15V1, 12.

## C. CONCLUSION

Over \$28 billion, 54,000 sorties, and 184,000 flight hours have been expended in support of Operation Noble Eagle. It is clear that ONE has cost a great deal in terms of money and impact on the people and the squadrons who execute the mission but it is not clear if there is a corresponding benefit for the effort. Success is hard to measure while operating in a defensive posture. Especially when there have not been any terrorist attacks in the U.S. using aircraft and the Department of Homeland Security's own aviation threat level advisory system says "there is no credible, specific intelligence suggesting an imminent threat to the homeland at this time."<sup>294</sup>

The U.S. Air Force is struggling to fund its current manpower needs to support the GWOT and recapitalize an ageing aircraft fleet. The average age of all the USAF's aircraft is 24 years and the service needs to buy a minimum of 164 new aircraft every year just to maintain the status quo.<sup>295</sup> The cost to fly and maintain the aging fleet has increase by almost 80% in the last 10 years.<sup>296</sup>

Seven years of Noble Eagle missions have put a strain on all squadrons trying to keep their pilots combat mission ready. It is difficult to quantify exactly what the cost of the ONE missions have been in terms of degraded combat capability and readiness. But, it is clear that the squadrons involved have given up thousands of valuable training sorties and almost 200,000 thousand flight hours to support Noble Eagle at some expense to their pilots combat mission ready (CMR) status.

The next chapter will review alternative aircraft and ground based air defense (GBAD) systems available for Noble Eagle Support. Each system will be evaluated based on their availability and utility as a more cost effective alternative for homeland air defense in lieu of using USAF fighters, AWACS, and airborne tankers.

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<sup>294</sup> DHS, "Current Threat Level," *Homeland Security Advisory System*, [http://www.dhs.gov/xinfo/share/programs/Copy\\_of\\_press\\_release\\_0046.shtm](http://www.dhs.gov/xinfo/share/programs/Copy_of_press_release_0046.shtm) (accessed 28 October 2008).

<sup>295</sup> McKinely.

<sup>296</sup> Ibid.

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## **VI. ALTERNATIVE AIR DEFENSE SYSTEMS**

### **A. GROUND BASED AIR DEFENSE SYSTEMS**

There are a number of capable and cost effective ground based air defense (GBAD) systems available for use in homeland air defense. The GBAD systems could be permanently positioned or moved around the country to augment NORAD's alert fighters in lieu of costly combat air patrols to protect National Special Security Events (NSSEs), critical infrastructure, and Presidential visits. Most of these air defense assets are mobile and have both lethal and non-lethal capabilities that could contribute to an integrated air defense system (IADS) along with existing alert aircraft. Many of these systems are already being used in the National Capital Region (NCR).

#### **1. Lethal GBAD System**



Figure 16. Patriot Missile System<sup>297</sup>

The Patriot missile is arguably the U.S. Army's most famous and effective air defense system. The Patriot PAC-2 is a long-range (~100 miles), "all-altitude, all-weather air defense system designed to intercept tactical ballistic missiles, cruise

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<sup>297</sup> SPG Media, "Patriot Missile Air Defense System, USA," army-technology.com, <http://www.army-technology.com/projects/patriot/> (accessed 31 October 2008).

missiles, UAVs, and advanced aircraft.”<sup>298</sup> The Patriot system is controlled by three operators who work in the mobile Integrated Fire Control Station (IFCS).<sup>299</sup> The operators get instructions from higher headquarters through data link and VHF radios.<sup>300</sup> Targeting information can be passed to the operators from headquarters or they can operate autonomously with the systems integrated phased array radar. The radar performs search, detection, track, target identification, along with missile tracking and guidance. The Patriot can track up to 100 targets and provide missile guidance for up to nine missiles simultaneously.<sup>301</sup> 159 Patriots were launched against SCUD missiles during Desert Storm in 1991.<sup>302</sup> The U.S. Army claims a 70% intercept success rate during that conflict and has made significant improvements to the system since Desert Storm.<sup>303</sup> The U.S. Army controls over 770 Patriot missiles.<sup>304</sup>



Figure 17. Surface Launched (SL) AMRAAM<sup>305</sup>

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<sup>298</sup> SPG Media.

<sup>299</sup> SPG Media.

<sup>300</sup> Ibid.

<sup>301</sup> Ibid.

<sup>302</sup> U.S. General Accounting Office, *Project Manager's Assessment of Patriot Missile's Overall Performance Is Not Supported*, GAO/T-NSIAD-92-27 (Washington, D.C.: 7 April 1992), 5.

<sup>303</sup> Ibid., 2.

<sup>304</sup> SPG Media.

<sup>305</sup> Defense Update, “SLAMRAAM,” *International Online Defense Magazine*, Year 2004, Issue: 2, <http://www.defense-update.com/products/s/slamraam.htm> (accessed 31 October 2008).

The Surface Launched Advanced Medium Range Air-to-Air Missile (SLAMRAAM) is based on the successful Mach 4, AIM-120 missile system developed by *Raytheon* for fighter aircraft. The SLAMRAAM costs \$2.6 million and is mounted on the versatile High Mobility Multipurpose Wheeled Vehicles (HMMWV).<sup>306</sup> The HMMWV gets about eight miles per gallon and can be driven or transported anywhere in the country to support Noble Eagle air defense at a fraction of the cost of flying fighters and tankers. For example, driving a HMMWV to Washington, D.C. from El Paso, TX would cost about \$750 in fuel vs. an F-15 from the same location would cost almost \$80,000.<sup>307</sup> Getting the mobile GBAD systems in place and on time at special events would require additional advanced planning and coordination by NORAD.



Figure 18. Sentinel Mobile Radar<sup>308</sup>

An Integrated Fire Control Station provides Battle Management Command, Control, Computer, Communication and Intelligence to the SLAMRAAM operators.<sup>309</sup>

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<sup>306</sup> Army Technology, "Surface-launched AMRAAM, Medium-Range Air Defense System, USA," *army-technology.com*, <http://www.army-technology.com/projects/surface-launched/> (accessed 2 December 2007).

<sup>307</sup> This hypothetical scenario assumes a 2000 mile trip with \$3 fuel cost for the HMMWV and a four hour flight for the F-15 at \$19,400 per hour.

<sup>308</sup> Ibid.

<sup>309</sup> SPG Media, "Surface-Launched AMRAAM (SL-AMRAAM) Medium-Ranged Air Defense System, USA," *army-technology.com*, <http://www.army-technology.com/projects/surface-launched/> (accessed 1 November 2008).



The operators use targeting information from off-board air defense networks including the Patriot, as well as the system's autonomous Sentinel mobile radar that can track targets out to 50 miles and engage hostile airborne threats at 20 miles..<sup>310</sup>

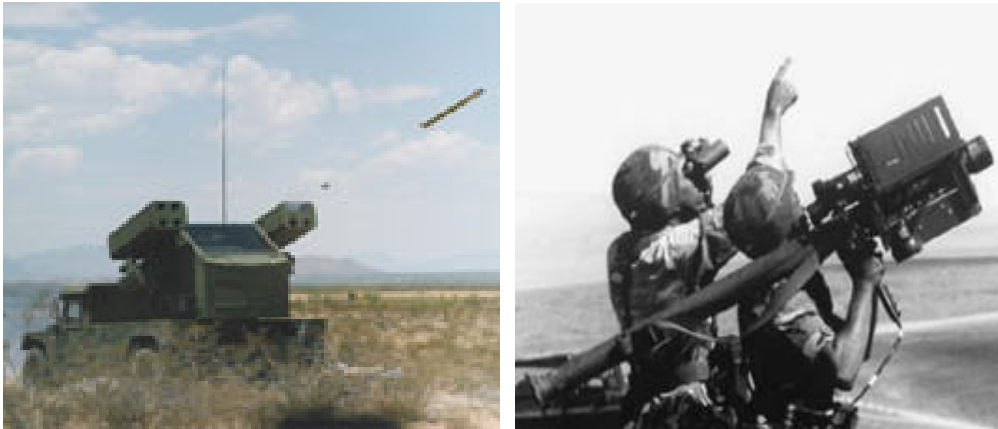


Figure 19. Avenger and Stinger Missile Systems<sup>311</sup>

The Sentinel radar can also pass targeting information to the U.S. Army's Avenger Low Level Air Defense System. The Avenger has a crew of two (driver and gunner) and uses a .50 caliber automatic machine gun along with eight Stinger heat seeking missiles. The .50 caliber machine gun is mounted on the right side of the turret and holds 200 rounds of ammunition.<sup>312</sup> The Stinger is a 35 pound, Mach 2.2 missile with a maximum altitude of 10,000 feet at a range of five miles.<sup>313</sup> Targets can be acquired and the missiles cued by radar, optical sight, or by a Forward Looking Infrared (FLIR) mounted on the left side of the turret.<sup>314</sup> An eye-safe laser rangefinder is used to determine targeting range when engaging optically. The U.S. Army currently has about 800 Avengers in service and over 13,400 shoulder fired Man-Portable Air Defense (MANPAD) Stinger missiles (see Figure 19 above).<sup>315</sup>

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<sup>310</sup> SPG Media, "Surface-Launched AMRAAM (SL-AMRAAM) Medium-Ranged Air Defense System, USA," *army-technology.com*.

<sup>311</sup> SPG Media, "Avenger Low Level Air Defense System, USA," *army-technology.com*, <http://www.army-technology.com/projects/avenger/> (accessed 1 November 2008).

<sup>312</sup> Ibid.

<sup>313</sup> Ibid.

<sup>314</sup> Ibid.

<sup>315</sup> SPG Media.



Figure 20. CG-47 TICONDEROGA-class AEGIS cruiser<sup>316</sup>

The U.S. Navy has 27 CG-47 TICONDEROGA-class AEGIS guided missile cruisers.<sup>317</sup> They are obviously not “ground” based but could be used effectively to provide 24 hour air defense near coastal areas (e.g., Cape Canaveral or in the Chesapeake Bay near Washington D.C.) to protect NSSEs from aerial attacks at a cost of approximately \$8,100 per hour to operate.<sup>318</sup> Each cruiser is equipped with a SPY-1 electronically scanned radar that automatically detects and tracks aircraft at over 200 miles and can engage them if necessary with their long range SAM system.<sup>319</sup>

The capabilities of the AEGIS ballistic missile defense system were proven in for the first time in February 2008 when the cruiser Lake Erie, based at Pearl Harbor shot down a U.S. spy satellite that had lost power and become unstable.<sup>320</sup>

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<sup>316</sup> Federation of American Scientists (FAS), “CG-47 Ticonderoga,” <http://www.fas.org/man/dod-101/sys/ship/cg-47.htm>, (accessed 2 November 2008).

<sup>317</sup> Jay Johnson, Admiral, U.S. Navy Chief of Naval Operations, “A Program Guide to the U.S. Navy-1999 Edition, Chapter 3,” <http://www.navy.mil/navydata/policy/vision/vis99/contents.html> (accessed 11 November 2008).

<sup>318</sup> Ibid.

<sup>319</sup> Federation of American Scientists (FAS).

<sup>320</sup> Audrey McAvoy, “Cruiser Shoots Down Missile in AEGIS Test,” Navy Times, 6 June 2008, [http://www.navytimes.com/news/2008/06/ap\\_missiletest\\_060508/](http://www.navytimes.com/news/2008/06/ap_missiletest_060508/) (accessed 11 November 2008).

## 2. Non-Lethal GBAD Systems

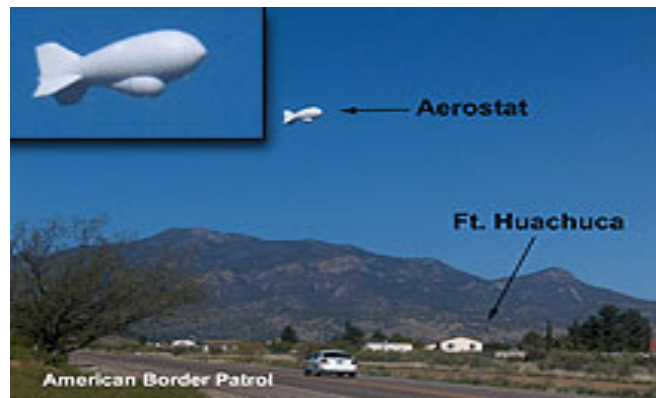


Figure 21. Aerostat Balloon<sup>321</sup>

Concerns about gaps in low altitude radar coverage are one of NORAD's justifications for having fighters in CAPs over special events and critical infrastructure. The fighters use their on-board radars to help NORAD search for low altitude "threats" and sanitize the airspace around the areas of interest. The tethered Aerostat Balloon system contains a radar that could be used to help contribute to NORAD's common air picture over recurring National Security Special Events (NSSEs) like space shuttle launches, POTUS movements to Camp David, and around critical infrastructure like the National Capital Region. The balloon can be raised to an altitude of 15,000 feet where it is able to detect and track aircraft at over 200 nautical miles.<sup>322</sup> The radar data is transmitted to the ground station below to be digitized and fed to the Customs and Border Patrol (CBP) and NORAD control centers.<sup>323</sup> The CBP has used the tethered Aerostat system since 1985 along America's southern border to help detect illegal drug trafficking flights entering the country at low altitude. Intelligence reports indicate a "dramatic decrease" in the amount of airborne drug trafficking since the Aerostats first went up above Ft Huachuca, AZ.<sup>324</sup> Stephen

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<sup>321</sup> American Patrol, "The Great Aerostat Mystery," <http://www.americanpatrol.com/06-FEATURES/060819-RENTI/Aerostatb.jpg> (accessed 2 November 2008).

<sup>322</sup> Federation of American Scientists (FAS), "Tethered Aerostat Radar System," <http://www.fas.org/nuke/guide/usa/airdef/tars.htm> (accessed 2 November 2008).

<sup>323</sup> Ibid.

<sup>324</sup> Federation of American Scientists (FAS).

Duncan, DoD's former coordinator for drug enforcement policy called the Aerostats "the most cost-effective counternarcotics detection, monitoring, and deterrent asset."<sup>325</sup> The Aerostat system could be used as a visible stand-alone deterrent to terrorism along with existing ANG alert fighters at NSSEs or in conjunction with a lethal GBAD system.

The U.S. Air Force consolidated the management contract for all the Aerostats in 1992.<sup>326</sup> They currently operate ten systems along the southern border at a cost of about \$3.5 million each per year, which is less than the cost for one weekend of fighter CAPs.<sup>327</sup>



Figure 22. Rapidly Elevated Aerostat Platform (REAP)<sup>328</sup>

The Rapidly Elevated Aerostat Platform (REAP) is a smaller, more mobile system that can be transported anywhere in the country in a portable container that can be loaded in the back of a truck or mounted on top of a HMMWV.<sup>329</sup> The REAP can be inflated and raised to 300 feet in less than five minutes; then remain airborne for up to 10 days.<sup>330</sup> The system contains electro-optical and night vision cameras with "an effective

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<sup>325</sup> FAS.

<sup>326</sup> Air Force Link, "Tethered Aerostat Radar System," <http://www.af.mil/factsheets/factsheet.asp?id=3507> (accessed 3 November 2008).

<sup>327</sup> Ibid.

<sup>328</sup> Andreas Parsch, "Tethered Aerostats," *Directory of U.S. Military Rockets and Missiles*, 2005, <http://www.designation-systems.net/dusrm/app4/aerostats.html> (accessed 3 November 2008).

<sup>329</sup> Ibid.

<sup>330</sup> Ibid.

surveillance radius of about 18 nautical miles.”<sup>331</sup> The REAP can also be equipped with VHF/UHF radios and act as a radio relay to improve NORAD’s low altitude line-of-sight communication problems at special events.<sup>332</sup>



Figure 23. Visual Warning System (VWS) in the National Capital Region<sup>333</sup>

The Visual Warning System (VWS) is a new tool developed after 9/11 to “communicate” with general aviation pilots who have entered restricted airspace around the National Capitol Region without authorization.<sup>334</sup> The system uses high-powered cameras to help visually identify rouge aircraft and then aim the eye-safe, red-green laser beam.<sup>335</sup> Pilots who see the lights directed at them are expected to immediately change their course and contact air traffic control as they exit the restricted airspace.

The VWS would be very cost effective system since the majority of fighter scrambles and CAP intercepts are directed against harmless general aviation pilots who have inadvertently entered restricted airspace or simply lost radio communication. The VWS could be mounted on a mobile platform and deployed to all NSSEs to augment a mobile GBAD and the ANG’s alert fighters as an alternative to fighter CAPs.

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<sup>331</sup> Parsch.

<sup>332</sup> Ibid.

<sup>333</sup> Lincoln Laboratory, “Homeland Protection Support / ERSAs,” *Massachusetts Institute of Technology*, <http://www.ll.mit.edu/mission/aviation/surveillanceandnav/ersasupport.html> (accessed 2 November 2008).

<sup>334</sup> Ibid.

<sup>335</sup> Ibid.

## **B. OTHER AIRCRAFT AVAILABLE FOR AIR DEFENSE**

There are a number of other DoD and federally owned aircraft that could be used for ground alert and air patrols in support of Operation Noble Eagle.

Helicopters for example have the flexibility to land almost anywhere near the POTUS or at an NSSE. The choppers could be scrambled within minutes from inside the restricted airspace to intercept general aviation aircraft that get too close or stray into the restricted zone. Most helicopters are not equipped with radars but could get vectors from NORAD (WADS/EADS) and use their on-board optical systems to intercept targets of interest (TOI). The helicopter crews could visually identify, assess hostile intent, offer assistance, and escort the TOI out of the restricted airspace. The armed helicopters would be able to engage the TOI with lethal force if the target was exhibiting hostile intent and met all the criteria required under the standing Noble Eagle rules of engagement (ROE). Unarmed helicopters could still be used but would pass off the hostile TOIs to the ground based air defense systems to engage with lethal force if necessary. The helicopter would then return to their designated landing zone in the restricted area and be ready for another scramble almost immediately. Using ground base alert helicopters at special events is much more cost effective than using fighters and tankers to circle overhead in CAPs.

The helicopters mentioned below are only a few examples of the types of aircraft that could be positioned on the ground at special security events to augment the standard ANG alert fighters and/or any mobile GBAD system.



Figure 24. OH-58 Kiowa Warrior<sup>336</sup>

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<sup>336</sup> Lincoln Laboratory.

The U.S. Army's OH-58D Kiowa Warrior Reconnaissance/Attack helicopter has a crew of two and can carry two Stinger heat-seeking missiles at a maximum speed of 125 knots.<sup>337</sup> The pilot aims and cues the Stinger missile using the mast-mounted sight or a helmet mounted sighting system. The mast-mounted sight above the rotor blades contains a sensor suite that includes a high-resolution television camera for long-range target detection/identification, thermal imaging sensor, and a laser rangefinder.<sup>338</sup> The Kiowa Warrior can also pass and receive targeting information over an advanced data link system. The Kiowa's data link could connect to NORAD's common air picture for additional situational awareness as well as pass/relay air and ground target information to a GBAD. The U.S. Army operates over 400 Kiowa Warriors.<sup>339</sup>



Figure 25. AH-64 Apache<sup>340</sup>

The Army's AH-64 Apache is another option for ground alert and air cover over special events and critical infrastructure. The Apache is more heavily armed but has the same basic sensors and data link capability as the OH-58D with a maximum speed of 197 knots.<sup>341</sup> The U.S. Army and ARNG currently operate over 800 AH-64s.<sup>342</sup>

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<sup>337</sup> SPG Media, "OH-58D Kiowa Warrior Reconnaissance / Attack Helicopter," <http://www.army-technology.com/projects/kiowa/> (accessed 1 November 2008).

<sup>338</sup> Ibid.

<sup>339</sup> Ibid.

<sup>340</sup> SPG Media, "AH-64A/D Apache Attack Helicopter," <http://www.army-technology.com/projects/apache/> (accessed 1 November 2008).

<sup>341</sup> Ibid.

<sup>342</sup> Ibid.



Along with most state and local law enforcement agencies, the U.S. Coast Guard (USCG) has a fleet of about 300 aircraft including 64 HU-25 Guardian fixed wing jets and 102 HH-65 Dolphins.<sup>343</sup> Each of these aircraft and their law enforcement certified crews could assist with Operation Noble Eagle missions around the country. The USCG is considered one of the five U.S. military services and is also a division of the Department of Homeland Security, so they would be a natural choice to support NORAD's multi-layered Noble Eagle air defense missions.

The USCG has actually been participating in a Rotary Wing Air Intercept program in the National Capital Region since 2006.<sup>344</sup> This program could be expanded to include all POTUS visits around the country and other National Special Security Events (NSSE).



Figure 26. HH-65 Dolphin<sup>345</sup>

The HH-65 Dolphin is operated by 18 different USCG Air Stations in the America as well as in the NCR.<sup>346</sup> The aircraft can remain in the air for over three hours while cruising at 120 knots and has a top speed of 165 knots.<sup>347</sup> The Dolphin is typically

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<sup>343</sup> Erich Klaus, "United States Coast Guard Aviation," *aeroflight*, <http://www.aeroflight.co.uk/waf/usa/USCG/Coast-Guard-home.htm#aircraft> (accessed 2 November 2008).

<sup>344</sup> John Edwards, "Taking a Coast Guard To New Heights," *United States Coast Guard*, 23 February 2007, <https://www.piersystem.com/go/doc/651/145886/> (accessed 5 November 2008).

<sup>345</sup> Klaus.

<sup>346</sup> Federation of American Scientists (FAS), "HH-65A Dolphin," <http://www.fas.org/man/dod-101/sys/ac/hh-65.htm> (accessed 2 November 2008).

<sup>347</sup> FAS.



unarmed but, as proven in the NCR, is still a viable option for the ground alert role or for airborne surveillance at special events. Like the other helicopters mentioned above, the Dolphin could be launched and vectored to intercept general aviation aircraft or UAVs violating the restricted airspace around the events at a fraction of the cost of fighter CAPs. The crew could then coordinate with NORAD and the mobile ground based air defense systems to engage rouge aircraft if determined to be a threat.



Figure 27. HU-25 Falcon Jet “Guardian”<sup>348</sup>

The Coast Guard’s HU-25 Falcon Jet can operate from the surface to 42,000 feet with a top speed of Mach .85.<sup>349</sup> The HU-25B “Air Eye” is equipped with an F-16 style APG-66 air-to-air radar, a FLIR, and pods carrying a side-looking radar (SALR) that is used to detect and track targets on the surface.<sup>350</sup> The HU-25 has a maximum range of 1,940 miles and can remain in the air for almost six hours without refueling.<sup>351</sup> The USCG Falcon Jet costs about \$3,700 per hour to operate compared to \$19,400 an hour for

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<sup>348</sup> United States Coast Guard, “Aircraft and Cutters,” <http://www.uscg.mil/datasheet/hu-25.asp> (accessed 2 November 2008).

<sup>349</sup> Global Security, “HU-25 Guardian,” <http://www.globalsecurity.org/military/systems/aircraft/hu-25.htm> (accessed 2 November 2008).

<sup>350</sup> Ibid.

<sup>351</sup> Ibid.

an average USAF fighter aircraft.<sup>352</sup> The HU-25 Air Eye's low cost, endurance and ability to sanitize both the air and ground around NSSEs make it a logical and cost effective choice for Operation Noble Eagle missions.

### C. CONCLUSION

Although a large number of the U.S. Army's soldiers are deployed to the Middle East, the ground based air defense equipment is sitting idle here in the U.S. because there are no air threats in Iraq or Afghanistan. The DoD has access to thousands of underutilized lethal and non-lethal GBAD systems as well as aircraft and ships. A combination of these systems could be used as a cost effective and potent joint combined arms force to protect America at home.

A number of these systems are already effectively being used in a layered defense around the nation's capitol. NORAD seems to be relying simply on fighter alerts and CAPs outside the NCR. If in fact the air threat exists, and NORAD is serious about homeland air defense, then there are good reasons for using additional assets for Operation Noble Eagle other than just fighters until we have a nation-wide IADS in place. The presence of helicopters, surface to air missile (SAMs), military radars, and/or Aerostat balloons would be a visible and powerful reminder to general aviation pilots to stay clear restricted airspace. The ground based systems would also be a visible deterrent to potential terrorists considering attacking America from the air as well as a visible show of force for the American people to demonstrate DoD's commitment to protecting the homeland.

Using alert helicopters and/or a mobile ground-base air defense system along with the existing ANG alert fighters would be a more cost effective layered defense for NORAD. This option would arguably be more of a deterrent to terrorism than flying the fighter CAPs out of sight at medium altitude over a POTUS visit, or flying low passes over *Disney World* during a Space Shuttle launch.

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<sup>352</sup> Harold Kennedy, "Coast Guard Adapts to Larger Homeland Security Mission," NDIA Business and Technology Magazine, August 2003, [http://www.nationaldefensemagazine.org/ARCHIVE/2003/AUGUST/Pages/Coast\\_Guard\\_Adapts3797.aspx](http://www.nationaldefensemagazine.org/ARCHIVE/2003/AUGUST/Pages/Coast_Guard_Adapts3797.aspx) (accessed 2 November 2008).

Using alternative air defense systems for Operation Noble Eagle would reduce the number of fighter CAPs needed. It would also reduce the number of erroneous fighter scrambles against miss-guided general aviation aircraft and allow the ANG's alert fighters to focus on the much less likely, but more catastrophic threat from hijacked airliners.

The final chapter will summarize the issues regarding Operation Noble Eagle, offer possible academic explanations for the lack of significant change in NORAD's Cold War-style air defense strategy, and make a final policy recommendation.

## **VII. CONCLUSION AND POLICY RECOMMENDATION**

### **A. CONCLUSION**

The air defense mission and the use of fighter aircraft in America has a long and respected history. Air defense has constantly changed along with threats, capabilities, and budgets. The mission evolved after the Japanese attack on Pearl Harbor from pure air defense to submarine reconnaissance using long-range patrol aircraft after the threat of an attack from the air subsided. Air defense and the use of fighters rose to prominence once again in the 1950s due to the ever-present threat of attack from the Soviet Union's bombers, only to see a slow decline starting in the early 1960s as more emphasis was placed on ICBMs. NORAD saw its force decline from its peak in 1961 of over 250,000 personnel assigned to 8 regions, with 14 air defense artillery gun batteries, 253 air defense missile batteries, 22 air divisions, over 2000 fighters and support aircraft, and 65 fighter/interceptor squadrons, to only seven ANG fighter squadrons with 14 aircraft sitting on alert by 2001.<sup>353</sup>

NORAD and the ANGs 1<sup>st</sup> Air Force performance on 9/11 reflected their lack of planning and preparation for such an attack. They have since made significant improvements to help keep America safe from another aerial attack. NORAD has spent billions of dollars to add nine additional ANG squadrons to the alert mission, hire thousands more personnel, construct/upgrade facilities, improve interagency coordination, modernize and expand their C3 systems, and add combat air patrols.

The U.S. intelligence community (IC), the international airline industry, and the general aviation (GA) community have all also made significant improvements since September 2001.

The IC now has a Director of National Intelligence (DNI) to advise the President, National Security Council and coordinate efforts among the 16 main U.S. intelligence

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<sup>353</sup> Dawson, 12.

agencies. The DNI is fostering a new philosophy for the “need to share” information within the federal, state, and local ICs rather than the pre-9/11 policy of sharing information only in cases of “need to know.”

The airline industry has implemented 20 additional layers of security to deter and prevent future hijackings, including the creation of the TSA with approximately 50,000 employees; along with arguably the most effective deterrent: an aware flying public that would not likely sit idle ever again during a hijacking attempt.

General aviation aircraft are considered to be a lower threat to our critical infrastructure due to their smaller size and slower airspeeds. But, that has not stopped the industry from implementing new measures to protect the American public including foreign pilot screening, additional security training for GA pilots and ground crews, as well as increased security around airports.

These additional security measures have reduced the risk of another 9/11 hijacking attack in America but this research could not find a corresponding decrease in the number of CAPs being scheduled by NORAD (1<sup>st</sup> Air Force) in the last six years. The Noble Eagle CAPs are using valuable training sorties and have burned over 184,000 flight hours.<sup>354</sup> Statistical data gathered from various fighter squadrons has shown that these CAPs are having a detrimental effect on the combat mission readiness status of their aircrew. The CAPs have cost the U.S. Air Force as much as \$1.3 billion each year with the total cost of the operation at almost \$29 billion.<sup>355</sup>

There are more cost-effective mobile ground-based air defense (GBAD) systems such as those being used in the National Capital Region. These systems are available to support Operation Noble Eagle, but we are continuing to use our finite conventional and costly fighter forces instead.

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<sup>354</sup> 1<sup>st</sup> Air Force, “AFNORTH Sortie Count” 1 June 2008, <http://www.1af.acc.af.mil/> (accessed 25 October 2008).

<sup>355</sup> Amy Belasco, CRS Report for Congress, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operations Since 9/11*, Washington D.C., Congressional Research Service, Library of Congress, RL33110, 8 February 2008, 19.

Operation Noble Eagle has become a steady state operation, even though there have been no attacks in the last seven years and DHS says, “there is no credible, specific intelligence suggesting an imminent threat to the homeland at this time” and their strategic assessment plan for 2008-2013 makes no mention of specific threats to aviation.<sup>356</sup> Bureaucratic politics and path dependence are two academic theories that could be applied to help explain why the Noble Eagle CAP missions are still being flown.

Path dependence occurs when institutions become self-reinforcing. It can be initiated by decisions that at the time seem “inconsequential but lead to uncontrollable consequences.”<sup>357</sup> Paul Krugman defines path dependence as “the powerful role of historical accident in determining the shape of the future.”<sup>358</sup> Douglas Puffert says “history matters, it has an enduring influence...choices made on the basis of transitory conditions can persist long after those conditions change.”<sup>359</sup> “Lock-in” is also an important concept in the path dependence theory. It means “having to accept inferior and costly standards, even though superior alternatives exist...and, the costs of switching are not high.”<sup>360</sup>

Bureaucratic politics refers to the popular theory summarized by a phrase first coined by Rufus E. Miles, who famously observed, “where you stand depends on where you sit.” Though “Miles’ Law” is not specific to security policy, it does portray an organizational dynamic in which individual judgments are strongly influenced by the institution to which the individual belongs; characterized by careerism and defense of individual empires.<sup>361</sup> Graham T. Allison states that “one will arrive at different

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<sup>356</sup> Department of Homeland Security (DHS), “Homeland Security Advisory System, Current Threat Level,” [http://www.dhs.gov/xinfo/share/programs/Copy\\_of\\_press\\_release\\_0046.shtm](http://www.dhs.gov/xinfo/share/programs/Copy_of_press_release_0046.shtm) (accessed 14 November 2008).

<sup>357</sup> Stan Leibowitz and Stephen E. Margolis, “Policy and Path Dependence,” *Regulation, The Cato Review of Business & Government* (Fall 1995) <http://www.cato.org/pubs/regulation/reg18n3.html> (accessed 6 December 2007).

<sup>358</sup> Leibowitz et al.

<sup>359</sup> Douglas Puffert, “Path Dependence” *EH.Net* <http://eh.net/encyclopedia/article/puffert.path.dependence> (accessed 6 December 2007).

<sup>360</sup> Leibowitz et al.

<sup>361</sup> Rufus E. Miles Jr., “The Origin and Meaning of Miles’ Law.” *Public Administration Review* 38, no. 5, September/October 1978, 399-403.

conclusions based on the spectacles one chooses.”<sup>362</sup> The bureaucratic politics theory offers some insight into why organizations whose funding and existence depend on Operation Noble Eagle, keep promoting the mission and why decision makers choose to continue flying CAPs.

The proposition that Noble Eagle CAPs should be flown until *someone* can say the “threat” has been eliminated and we can go back to something a little less rigorous will needlessly squander the U.S. Air Force’s limited resources during these challenging economic times and adversely affect future combat capabilities. The fact that we have not experienced another 9/11 hijacking or a general aviation terrorist attack in the last seven years should not be considered sufficient justification for continuing the status quo and keeping the fighter CAPs in the air. Rather the contrary: it should be a reason to consider alternative, more cost-effective long-term solutions.

## **B. POLICY RECOMMENDATION**

The lack of current intelligence indicating a specific threat to aviation along with the high cost of the CAPs and their detrimental effects on the squadrons flying the missions leads this research to the conclusion that the CAPs should be discontinued. The CAPs can always be scheduled again in the future if actionable intelligence exists and the threat dictates. In the mean time, the costs for the CAPs outweigh the benefits and the program should be shelved while NORAD continues to work with the intelligence community to pursue better methods for gathering and assessing intelligence specifically for air threats in America. NORAD also needs to pursue the use of more cost effective, long term air defense solutions including the use of both lethal and non-lethal GBAD systems for deterrence and defense in the homeland.

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<sup>362</sup> Graham T. Allison. “Conceptual Models and the Cuban Missile Crisis.” *American Political Science Review*, 63, no. 3, September 1969, 715.

## LIST OF REFERENCES

- 1<sup>st</sup> Air Force, AFNORTH Sortie Count, [www.1af.acc.af.mil/](http://www.1af.acc.af.mil/) (accessed 23 May 2008).
- \_\_\_\_\_. “AFNORTH MISSION,” *1<sup>st</sup> Air Force*, <http://www.1af.acc.af.mil/library/factsheets/factsheet.asp?id=4107> (accessed 15 October 2008).
- \_\_\_\_\_. “History of 1<sup>st</sup> Air Force,” <http://www.1af.acc.af.mil/library/factsheets/factsheet.asp?id=4106> (accessed 27 August 2008).
- \_\_\_\_\_. “601<sup>st</sup> AOC” *1<sup>st</sup> Air Force*, <http://www.1af.acc.af.mil/units/601staoc/index.asp> (accessed 15 October 2008).
- “9/11 and Terrorist Travel,” *A staff Report of the National Commission on Terrorist Attacks Upon the United States* (Franklin, Tennessee: Hillsboro Press, 2004).
- Air Force Historical Research, [http://afhra.maxwell.af.mil/rso/rso\\_index.html](http://afhra.maxwell.af.mil/rso/rso_index.html) (accessed 20 August 08).
- Air Force Magazine, “One step forward, two steps back,” *airforce-magazine.com*, (2/6/2007), <http://www.airforcemagazine.com/DRArchive/Pages/2007/February%202007/February%2006%202007/1030forward.aspx> (accessed 14 October 2008).
- \_\_\_\_\_. “Relentless vigil,” *airforce-magazine.com*, <http://www.airforce-magazine.com/DRArchive/Pages/2008/May%202008/May%2020%202008/RelentlessVigil.aspx> (accessed 14 October 2008).
- \_\_\_\_\_. “2001 USAF Almanac,” *Air Force Magazine*, May 2001.
- \_\_\_\_\_. “Noble Eagle ramps up for shuttle,” *airforce-magazine.com*, <http://www.airforce-magazine.com/DRArchive/Pages/2007/August%202007/August%2003%202007/1030noble.aspx> (accessed 14 October 2008).
- Air Force Instruction (AFI) 11-202, Volume 1, “Flying Operations, AIRCREW TRAINING,” 17 May 2007, 4 <http://www.e-publishing.af.mil/shared/media/epubs/AFI11-202V1.pdf> (accessed 25 October 2008).
- Air Force Link, “Tethered Aerostat radar system,” <http://www.af.mil/factsheets/factsheet.asp?id=3507> (accessed 3 November 2008).
- AF/XO, “USAF Roles and Missions in Homeland Security,” 4 October 2001.



Air University, "AEF and Homeland Security: The ANG's Competing Roles," *Quick-Look 04-26*, <http://research.airuniv.edu> (accessed 25 October 2007).

Aircraft Owners and Pilots Association, "AOPA-commissioned report concludes general aviation not a threat to nuclear power plants," <http://www.aopa.org/whatsnew/newsitems/2002/02-2-160.html> (accessed 14 September 2008).

\_\_\_\_\_. "Flight Operations in the Washington, D.C. ADIZ," AOPA Online, <http://www.aopa.org/adiz/adiz.html> (accessed 15 October 2008).

\_\_\_\_\_. "General Aviation and Homeland Security," [http://www.aopa.org/whatsnew/newsitems/2002/020621\\_homeland\\_security.html](http://www.aopa.org/whatsnew/newsitems/2002/020621_homeland_security.html) (accessed 14 September 2008).

\_\_\_\_\_. "AOPA and Other General Aviation Organization Offer Action Plan For enhancing GA Security," <http://www.aopa.org/whatsnew/newsitems/2001/01-4-212.html> (accessed 14 September 2008).

Allen, Matthew M. "Reducing the risk," *Homeland Security Affairs*, <http://www.hsaj.org/?essays:fullarticle=essays.1.1> (accessed 9 September 2008).

Allison, Graham T. "Conceptual models and the Cuban Missile Crisis." *American Political Science Review*, 63, no. 3 (September 1969).

Amass, Sandra F. et al. *The Science of Homeland Security*, West Lafayette, IN: Purdue University Press, 2006.

American Patrol, "The Great Aerostat Mystery," <http://www.americanpatrol.com/06-FEATURES/060819-RENTI/Aerostatb.jpg> (accessed 2 November 2008).

Army Technology. "Avenger low level air defense system, USA," *army-technology.com*, <http://www.army-technology.com/projects/avenger/index.html> (accessed 2 December 2007).

\_\_\_\_\_. "Surface-launched AMRAAM, medium-range air defense system, USA," *army-technology.com*, <http://www.army-technology.com/projects/surface-launched/> (accessed 2 December 2007).

Associated Press, Washington. "Hijackers carried fake visas," 27 January 2004, <http://www.guardian.co.uk/world/2c004/jan/27/september11.usa> (accessed 3 September 2008).

- Belasco, Amy. CRS Report for Congress, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operations Since 9/11*, Washington D.C., Congressional Research Service, Library of Congress, RL33110, 8 February 2008.
- Blankley, Tony. *The west's last chance*. Washington: Regenery Publishing, Inc., 2005.
- Boyne, Walter J. "The rise of air defense," *Air Force Magazine*, December 1999.
- Bronner, Michael. 9/11 Live: The NORAD Tapes, Vanity Fair, August 2006, <http://www.vanityfair.com/politics/features/2006/08/norad200608?currentPage=1> (accessed 9 May 08).
- Brown, Herb Col, USAF, "USAF support to homeland defense and civil support" presentation given to the Homeland Security students at the Naval Postgraduate School, Monterey, CA. 5 February 2008.
- Cable News Network (CNN). "DHS taking over checking passenger info against watch lists," <http://www.cnn.com/2007/US/08/09/dhs.security/index.html> (accessed 8 September 2008).
- Congressional, 9/11 Commission Staff Statement No. 17. *National Commission on Terrorist Attacks Upon the United States*, 17 June 2004, [www.msnbc.msn.com/id/5233007/](http://www.msnbc.msn.com/id/5233007/) (accessed 3 November 2007).
- Conway III, John L. "AEF and Homeland Security: The Air National Guard's Competing Roles," *Quick-Look 04-26*, <http://research.airuniv.edu> (accessed 25 April 2008).
- Corsi, Jerome R. "NORAD's new home," *World Net Daily*, 19 June 2007, [http://www.worldnetdaily.com/news/article.asp?ARTICLE\\_ID=56234](http://www.worldnetdaily.com/news/article.asp?ARTICLE_ID=56234) (accessed 25 October 2008).
- Dawson, William H. Major, USAF. *The Usefulness of NORAD in the Aerospace Environment* Maxwell AFB, Ala.: Air Command and Staff College, 1973.
- Department of Homeland Security. "US-VISIT program," [http://www.dhs.gov/xtrvlsec/programs/content\\_multi\\_image\\_0006.shtm](http://www.dhs.gov/xtrvlsec/programs/content_multi_image_0006.shtm) (accessed 4 September 2008).
- \_\_\_\_\_. "Homeland Security Advisory System," 24 October 2008 [http://www.dhs.gov/xinfo/share/programs/Copy\\_of\\_press\\_release\\_0046.shtm](http://www.dhs.gov/xinfo/share/programs/Copy_of_press_release_0046.shtm) (accessed 25 October 2008).
- Edwards, John. "Taking a coast guard to new heights," *United States Coast Guard*, 23 February 2007, <https://www.piersystem.com/go/doc/651/145886/> (accessed 5 November 2008).

- Federation of American Scientists (FAS), "CG-47 Ticonderoga," <http://www.fas.org/man/dod-101/sys/ship/cg-47.htm>, (accessed 2 November 2008).
- \_\_\_\_\_. "HH-65A Dolphin," <http://www.fas.org/man/dod-101/sys/ac/hh-65.htm> (accessed 2 November 2008).
- \_\_\_\_\_. "Tethered Aerostat radar system," <http://www.fas.org/nuke/guide/usa/airdef/tars.htm> (accessed 2 November 2008).
- Federal Aviation Administration. "Fact sheet, aircraft security accomplishment since Sept. 11 (September 2002)" [http://www.faa.gov/newsroom/factsheets/2002/factsheets\\_020905.htm](http://www.faa.gov/newsroom/factsheets/2002/factsheets_020905.htm) (accessed 29 August 2008).
- Ferguson, Charles. *No End in Sight, The American occupation of Iraq*. Magnolia Pictures, Documentary, 2007.
- Finley, Bruce. "Military to put Cheyenne Mountain on standby," *denverpost.com*, 26 December 2006, [http://www.denverpost.com/nationworld/ci\\_4103478](http://www.denverpost.com/nationworld/ci_4103478) (accessed 29 October 2008).
- Flynn, Stephen. *The edge of disaster, rebuilding a resilient nation*. New York, NY: Random House, 2007.
- Global Security, "First Air Force" *GlobalSecurity.org*, <http://www.globalsecurity.org/military/agency/usaf/1af.htm> (accessed 15 October 2008).
- \_\_\_\_\_. "HU-25 Guardian," <http://www.globalsecurity.org/military/systems/aircraft/hu-25.htm> (accessed 2 November 2008).
- \_\_\_\_\_. "Operation Noble Eagle," *GlobalSecurity.org*, 27 April 2005, [www.globalsecurity.org/military/ops/noble-eagle.htm](http://www.globalsecurity.org/military/ops/noble-eagle.htm) (accessed 25 April 2008).
- General Accounting Office, *Aviation Security, Efforts to Measure Effectiveness and Address Challenges*, GAO-03-843. Washington, D.C.: GAO, 30 June 2003.
- \_\_\_\_\_. *Aviation Security, Progress Since September 11, 2001 and the Challenges Ahead*, GAO-03-1150T. Washington, D.C.: GAO, 9 September 2003.
- \_\_\_\_\_. *Homeland Defense, DOD Needs to Assess the Structure of U.S Forces for Domestic Military Mission*, GAO-03-670. Washington, D.C.: GAO, July 2003.

- \_\_\_\_\_. *Project Manager's Assessment of Patriot Missile's Overall Performance Is Not Supported*, GAO/T-NSIAD-92-27. Washington, D.C.: GAO, 7 April 1992.
- Goldman, David. "Iraq war could cost taxpayers \$2.7 trillion," CNNMoney.com, 12 June 2008,  
[http://money.cnn.com/2008/06/11/news/economy/iraq\\_war\\_hearing/index.htm?cn n=yes](http://money.cnn.com/2008/06/11/news/economy/iraq_war_hearing/index.htm?cn n=yes) (accessed 26 October 2008).
- Gordon, Philip. "Can the war on terror be won?" *Foreign Affairs* 86, no. 6 (November/December 2007), 54.
- Government Accountability Office, Report on Transportation Security, Post –September 11<sup>th</sup> Initiatives and Long-Term Challenges. Washington DC:, 31 March 2003.
- Graham, Bradley. "Eagle eyes over the homeland: false alarms, big threat keep U.S. air defenses busy," *The Washington Post*, 30 October 2001.
- Griffin, Drew. "Sources: air marshals missing from almost all flights,"  
<http://www.cnn.com/2008/TRAVEL/03/25/siu.air.marshals/index.html?iref=mpstoryview> (accessed 29 August 2008).
- Harris, Shane. "Five years after 9/11, question is: could it happen again?" *Government Executive*, 1 September 2006,  
[www.governmentexecutive.com/story\\_page.cfm?articleid=34922&ref=relink](http://www.governmentexecutive.com/story_page.cfm?articleid=34922&ref=relink) (accessed 4 November 2007).
- Hastedt, Glen. *American foreign policy, past, present, future*. Upper Saddle River, NJ: Pearson Education, 2008.
- Hebert, Adam J. "Homeland Air Force," *Air Force Magazine*, January 2004.
- \_\_\_\_\_. "Homeland defense," *Air Force Magazine*, November 2001,  
[www.afa.org/magazine/nov2001/1101homeland.asp](http://www.afa.org/magazine/nov2001/1101homeland.asp) (accessed 2 November 2007).
- \_\_\_\_\_. "Noble Eagle without end," *Air Force Magazine*, February 2005.
- Heyman, David. "Analysis of the National Counterterrorism Center annual report on terrorism," *Center for Strategic & International Studies*, 1 May 2008,  
[http://www.csis.org/media/csis/pubs/080501\\_heyman\\_nctc.pdf](http://www.csis.org/media/csis/pubs/080501_heyman_nctc.pdf) (accessed 2 May 08).
- Holmes, Erik. "Officials say current plans create fighter gap," *Air Force Times*, (17 April 2008), [http://www.airforcetimes.com/news/2008/04/airforce\\_jsf\\_041508/](http://www.airforcetimes.com/news/2008/04/airforce_jsf_041508/) (accessed 29 October 2008).

- Houk, Michael W. SSgt. "Army Guard takes charge of National Capital Region's air defense," Air Defense Artillery Online (14 December 2006), <http://www.airdefenseartillery.com/online/December%202006/Guard%20Homeland%20Air%20Defense.htm> (accessed 15 October 2008).
- Huntington, Samuel P. *The Clash of Civilizations and the Remaking of World Order*. New York: Simon and Schuster Paperbacks, 1996.
- Jensen, Owen E. "The years of decline: Air Defense from 1960 to 1980." *Strategic Air Defense*, ed. Stephen J. Cimbala. Wilmington, Del.: Scholarly Resources Imprint, 1989.
- Jockel, Joseph T. *No boundaries upstairs: Canada, the United States, and the origins of North American air defense, 1945-1958*. Vancouver: University of British Columbia Press, 1987.
- Johnson, Jay. Admiral, U.S. Navy Chief of Naval Operations, "A program guide to the U.S. Navy-1999 Edition, Chapter 3," <http://www.navy.mil/navydata/policy/vision/vis99/contents.html> (accessed 11 November 2008).
- Kantor, Paul et al. *Intelligence and Security Informatics*, Atlanta, GA.: Springer Press, 2005.
- Karol, Kevin P. Lt Col, USAF. "Operational organization for homeland defense. Newport, R.I.: Naval War College, 1999.
- Kennedy, Harold. "Coast Guard adapts to larger homeland security mission," *NDIA Business and Technology Magazine*, August 2003, [http://www.nationaldefensemagazine.org/ARCHIVE/2003/AUGUST/Pages/Coast\\_Guard\\_Adapts3797.aspx](http://www.nationaldefensemagazine.org/ARCHIVE/2003/AUGUST/Pages/Coast_Guard_Adapts3797.aspx)
- King, John and Elaine Quijano, "9/11 Panel Report: we must act," *CNN.com* (23 July 2004), <http://www.cnn.com/2004/ALLPOLITICS/07/22/911.report/> (accessed 16 October 2008)
- Klaus, Erich. "United States Coast Guard aviation," *aeroflight*, <http://www.aeroflight.co.uk/waf/usa/USCG/Coast-Guard-home.htm#aircraft> (accessed 2 November 2008).
- Koch, Kathleen. "Lasers warn pilots of restricted airspace," *CNN.com*, (11 February 2005), <http://edition.cnn.com/2005/TECH/02/11/laser.demo/> (accessed 15 October 2008).

- Kovaleski, David. *US-VISIT: what does it mean for you?* 15 March 2004, [http://meetingsnet.com/news/meetings\\_usvist\\_mean/](http://meetingsnet.com/news/meetings_usvist_mean/) (accessed 26 May 2008).
- KMOV, St. Louis Area News, "Air National Guard officials discuss investigation of F-15 crash," 10 January 2008, [http://www.kmov.com/localnews/stories/kmov\\_localnews\\_080110\\_plane crashres ults.b88f6c4.html](http://www.kmov.com/localnews/stories/kmov_localnews_080110_plane crashres ults.b88f6c4.html) (accessed 29 October 2008).
- Kreisher, Otto. "The years of Noble Eagle," *Air Force Magazine*, June 2007.
- Leibowitz, Stan and Stephen E. Margolis. "Policy and path dependence," *Regulation, The Cato Review of Business & Government* (Fall 1995) <http://www.cato.org/pubs/regulation/reg18n3.html> (accessed 6 December 2007).
- Levin, Alan. "Part 1: Terror attacks brought drastic decision: clear the skies," *USA Today*, 12 August 2002.
- Levine, Samantha. "The marshals' cloudy skies," *U.S. News*, 29 August 2008.
- Lincoln Laboratory, "Homeland protection support / ERSA," *Massachusetts Institute of Technology*, <http://www.ll.mit.edu/mission/aviation/surveillanceandnav/ersasupport.html> (accessed 2 November 2008).
- Looney, Robert. "Economic cost to the United States stemming from the 9/11 attacks," *Strategic Insights*, Volume 1, Issue 6 (August 2002).
- Lush, Tamara. "Plane hits skyscraper," *St Petersburg Times*, 6 January 2002.
- Lustick, Ian S. *Trapped in the war on terror*. Philadelphia: University of Pennsylvania Press, 2006.
- Makinen, Gail. "The economic effects of 9/11: a retrospective assessment," *CRS*, (27 September 2002), CRS 30.
- Maxwell, Bruce. *Homeland security a documentary history*. Washington, D.C.: CQ Press, 2004.
- McConnell, Mike (DNI). "Follow-up report on the status of the 100 day plan," [http://www.odni.gov/press\\_releases/20070913\\_release.pdf](http://www.odni.gov/press_releases/20070913_release.pdf) (accessed 29 August 2008).
- McKenna, Pat. "The border guards-NORAD: the eyes and ears of North America," *Airman* 40, no. 1, 1 January 1996.

- McMillin, Sue. "NORAD adding its muscle to the fight against drugs," *Air Force Times*, 24 September 2001.
- McKinley, Rodney J. Office of the Chief Master Sergeant of the Air Force, "Air Force key talking points," Volume 3, Edition 9 (September 2008).
- Mehuron, Tamar A. Associate Editor, "USAF almanac 2005," *Air Force Magazine*, May 2005.
- Miles, Rufus E. Jr., "The origin and meaning of Miles' law." *Public Administration Review* 38, no. 5 (Sep.-Oct., 1978).
- Miller, Edward S. *War Plan Orange: The U.S. strategy to defeat Japan, 1897-1945*. Annapolis, Md.: Naval Institute Press, 1991.
- Miller, Jason. "DHS to Issue Plan for US-VIST Exit Program," *Government information group*, 18 October 2007, <http://www.fcw.com/online/news/150554-1.html#> (accessed 4 September 2008).
- Mott, William H. Lt. Col, USAF. "F-15A versus F/A-22 initial operational capability," Air War College, Maxwell Paper No. 36, November 2005.
- Murray, Douglas. "NORAD and U.S. nuclear operations," in *Fifty Years*
- NORAD, About Us. <http://www.spacecom.af.mil/norad/about-us.htm> (accessed 26 May 2008). "Operation Noble Eagle," *GlobalSecurity.org*, 27 April 2005, [www.globalsecurity.org/military/ops/noble-eagle.htm](http://www.globalsecurity.org/military/ops/noble-eagle.htm) (accessed 25 April 2008).
- \_\_\_\_\_. "NORAD history," <http://www.norad.mil/about/history.html> (accessed 25 August 2008).
- Office of the Director of National Intelligence (ODNI), <http://www.odni.gov/index.html> (accessed 29 August 2008).
- Parsch, Andreas. "Tethered Aerostats," *Directory of U.S. Military Rockets and Missiles*, 2005, <http://www.designation-systems.net/dusrm/app4/aerostats.html> (accessed 3 November 2008).
- Pierson, Paul. "Increasing returns, path dependence, and the study of politics," *The American Political Science Review* (Jun., 2000).
- President of the United States. *The national strategy for homeland security*, Washington D.C.: 2007 <http://www.whitehouse.gov/infocus/homeland/nshs/2007/index.html> (accessed 25 May 2008).



- Puffert, Douglas. "Path dependence" *EH.Net*  
<http://eh.net/encyclopedia/article/puffert.path.dependence> (accessed 6 December 2007).
- Rigge, Simon. *War in the outposts, World War II*. Alexandria, VA.: Time Life Books. 1980.
- Ross, Brian, Vic Walter and Eric Longabardi, "9/11 redux: 'Thousands of aliens' in U.S. flight schools illegally," *ABC NEWS*, (27 February 2008)  
<http://abcnews.go.com/Blotter/story?id=4353991&page=1> (accessed 2 March 2008).
- Schaffel, Kenneth. *The emerging shield: the Air Force and the evolution of continental air defenses, 1945-1960*. Washington D.C.: Office of Air Force History, 1991.
- Schanz, Marc V. "Scarce flying hours," *Air Force Magazine*, January 2008,  
<http://www.afa.org/magazine/jan2008/0108scarce.html> (accessed 30 April 08).
- Shane, Scott. "Budget for U.S. intelligence," *The New York Times*, 8 November 2005.
- Sims, Jennifer. *Transforming U.S. intelligence*. Washington D.C.: Georgetown University Press, 2005.
- SPG Media, "AH-64A/D Apache attack helicopter," <http://www.army-technology.com/projects/apache/> (accessed 1 November 2008).
- \_\_\_\_\_. "OH-58D Kiowa warrior reconnaissance / Attack Helicopter," <http://www.army-technology.com/projects/kiowa/> (accessed 1 November 2008).
- \_\_\_\_\_. "Patriot missile air defense system, USA," <http://www.army-technology.com/projects/patriot/> (accessed 31 October 2008).
- Statement before the national commission on terrorist attack upon the U.S., 17 June 2004,  
[http://www.9-11commission.gov/hearings/hearing12/eberhart\\_statement.pdf](http://www.9-11commission.gov/hearings/hearing12/eberhart_statement.pdf)  
 (accessed 9 May 08).
- Stetson, Conn, Rose C. Engelman, and Byron Fairchild, *United States Army in World War II: the western hemisphere, guarding the United States and its outposts*. Washington D.C.: Office of the Chief of Military History, Department of the Army, 1964.
- Stevens, Donald et al. *Near term options for improving security at Los Angeles International Airport*, Santa Monica, CA: Rand Corporation, 2004.



Stewart, Mark G. "A risk and cost-benefit assessment of United States aviation security measures," <http://cryptome.org/avsec-assess.pdf> (accessed 8 September 2008).

"Surface-launched AMRAAM, medium-range air defense system, USA," *army-technology.com*, <http://www.army-technology.com/projects/surface-launched/> (accessed 2 December 2007).

Tirpak, John A. "Airpower for the long haul," *Air Force Magazine*, (March 2002),

Transportation Security Administration (TSA), "Department of Homeland Security, alien flight student program" [https://www.flightschoolcandidates.gov/afsp2/afspindex.py?acct\\_type=c&section=LI](https://www.flightschoolcandidates.gov/afsp2/afspindex.py?acct_type=c&section=LI) (accessed 2 March 2008).

\_\_\_\_\_. "Federal flight deck officers," <http://www.tsa.gov/lawenforcement/programs/ffdo.shtm> (accessed 30 August 2008).

\_\_\_\_\_. Law enforcement, office of training and development," [http://www.tsa.gov/lawenforcement/training/fams\\_training.shtm](http://www.tsa.gov/lawenforcement/training/fams_training.shtm) (accessed 29 August 2008).

\_\_\_\_\_. "Secure flight program," [http://www.tsa.gov/what\\_we\\_do/layers/secureflight/index.shtm](http://www.tsa.gov/what_we_do/layers/secureflight/index.shtm) (accessed 2 September 2008).

\_\_\_\_\_. "Who we are," [http://www.tsa.gov/who\\_we\\_are/what\\_is\\_tsa.shtm](http://www.tsa.gov/who_we_are/what_is_tsa.shtm) (accessed 29 August 08).

Tzu, Sun. *The art of war*. London: Oxford Press, 1963.

Unger, Eric J. *An examination of the relationship between usage and operating and support costs for Air Force aircraft*. Santa Monica, CA: RAND Corporation, 2008.

U.S. Department of Justice, Federal Bureau of Investigation. "Terrorism 2002-2005," [http://www.fbi.gov/publications/terror/terrorism2002\\_2005.pdf](http://www.fbi.gov/publications/terror/terrorism2002_2005.pdf) (accessed 31 November 2007).

U.S. Department of Transportation, "Airline travel since 9/11," [http://www.bts.gov/publications/issue\\_briefs/number\\_13/html/entire.html](http://www.bts.gov/publications/issue_briefs/number_13/html/entire.html) (accessed 28 August 2008).

U.S. Northern Command, "About NORTHCOM," <http://www.northcom.mil/About/index.html> (accessed 14 October 2008).

- Voice of America, "U.S. officials outline deficiencies in visa screening process," <http://www.voanews.com/english/archive/2004-09/a-2004-09-09-36-1.cfm> (accessed 8 September 2008).
- Washington Air National Guard, "Western air defense sector" <http://wads.washingtonairguard.com/index.shtml> (accessed 15 October 2008).
- Weyrich, Paul. "Arming airline pilots," *Newsmax*, 12 May 2005, [archive.newsmax.com/archives/articles/2005/5/11/171108.shtml](http://archive.newsmax.com/archives/articles/2005/5/11/171108.shtml) (accessed 2 March 2008).
- Woo, Gordon. *Quantitative terrorism risk assessment*, risk management solutions, Ltd. [http://www.rms.com/NewsPress/Quantitative\\_Terrorism\\_Risk\\_Assessment.pdf](http://www.rms.com/NewsPress/Quantitative_Terrorism_Risk_Assessment.pdf) (accessed 24 May 2008).
- Pam Zubeck, "Closing NORAD May cost \$12B," *The Colorado Springs Gazette*, 15 June 2007.
- Zuckerman, Laurence. "A day of terror: the airlines," *The New York Times*, 12 September 2001.

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